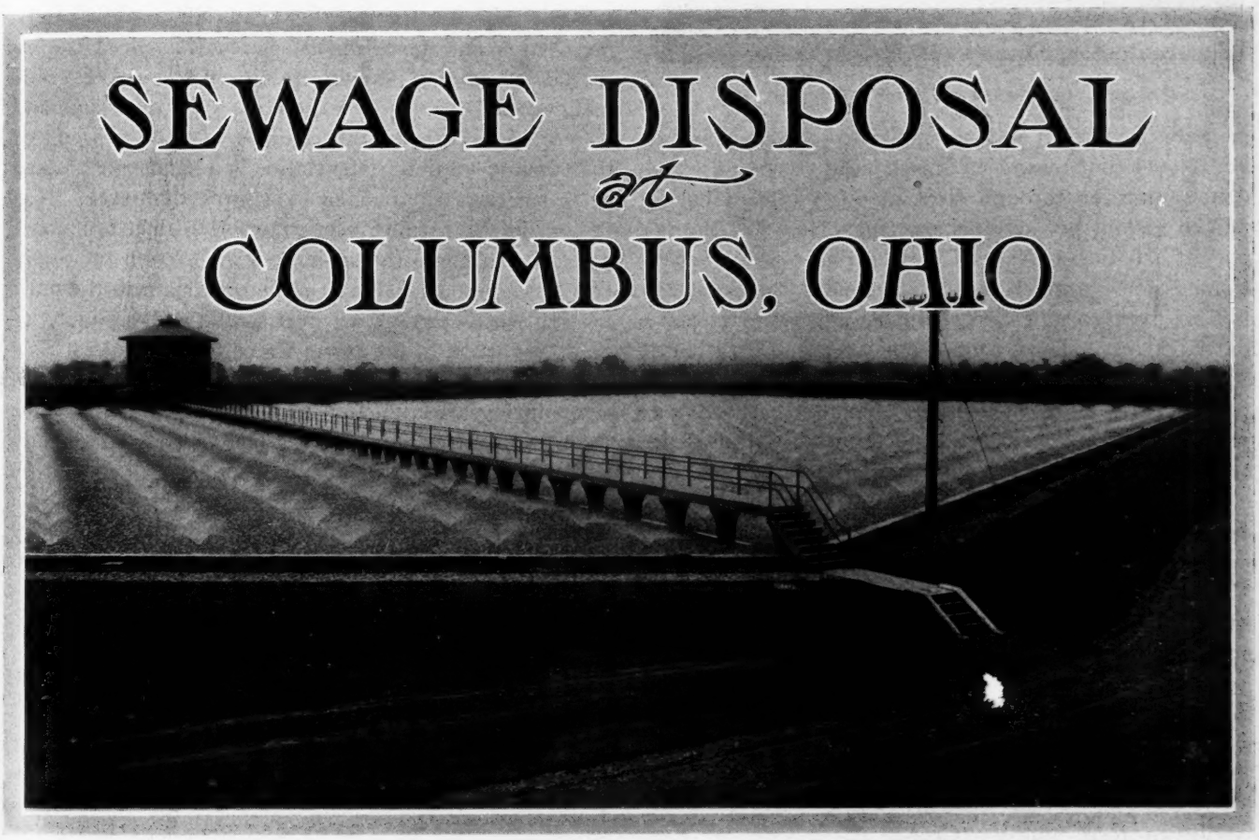
Municipal Journal
And Engineer

VOLUME XXVI. NEW YORK, MAY 5, 1909. No. 18

SEWAGE DISPOSAL at COLUMBUS, OHIO



SPRINKLING FILTERS IN OPERATION UNDER A FIVE-FOOT HEAD

By E. A. KEMMLER

COLUMBUS, the capital of Ohio, is situated at the confluence of the Scioto and Olentangy rivers. Its population, according to the last census, was 125,000. The present population is estimated at from 200,000 to 225,000. The West Side is low-lying territory, from five to ten feet below the flood stage of the river, adjacent to and extending about two miles back from the Scioto River, beyond which it rises rather abruptly to the west bluff, about seventy-five feet above the flats. The East Side is practically all high land, the bluff running close to and paralleling the Scioto and Olentangy rivers. About 75 per cent of this area lies on the watershed of the Scioto and Olentangy rivers, and 25 per cent on that of Alum Creek, the eastern boundary. Since December, 1908, all of sewage that would naturally flow into Alum Creek has been intercepted near the outfall of the main sewer and pumped through a 20-inch cast-iron force main into the Scioto River system.

The West Side is sewered on the separate system; the East Side on the combined, with a main intercepting sewer crossing and connecting with all of the main trunk sewers near the outfalls. The West Side sewage reaches the newly constructed main sewage pumping station by way of the 42-inch main sanitary sewer in Jackson Pike, Franklin Township, and running thence diagonally through lands acquired by the city adjacent to the station. The East Side sewage reaches the station through the intercepting sewer already referred to.

Agitation for the purification of the sewage began as early as 1888, when Mr. Chas. Danenhauer, of Cincinnati, was engaged to prepare and submit a report on the proposed intercepting sewer and the disposal of the sewage. The sewer was constructed soon after, but the disposal project remained in abeyance until the fall of 1903, although three additional reports had been made meantime, viz.: that of Messrs. John W. Alvord, of Chicago, and Julian Griggs, the then Chief Engineer,

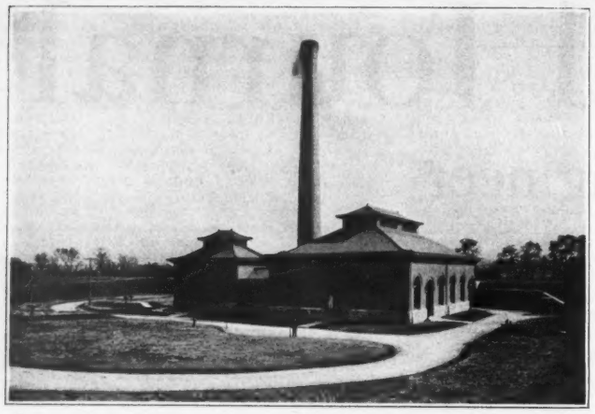


FIG. 2. MAIN SEWAGE PUMPING STATION.

in 1898, in which it was recommended that the sewage be treated by means of mechanical screening and double filtration through coke, at a net rate of half a million gallons per acre per day; next, in 1900, the report of Mr. Julian Griggs, Chief Engineer of the Sewer Commission, in which was recommended the construction of twenty septic tanks with an aggregate capacity of 10,000,000 gallons, equal to an average of 12 hours flow, on the basis of 20,000,000 gallons; lastly, the report of Mr. Rudolph Hering, submitted in 1901, in which septic tanks and artificially constructed intermittent sand filters were recommended.

At the November election in 1903 a proposition to bond the city for the amount necessary to construct sewage disposal works was submitted to the electors of Columbus, and was carried, largely through the vigorous campaign waged by the South Side Board of Commerce. Shortly after Messrs. Hering & Fuller were selected as consulting engineers. It was decided to construct and operate an experimental purification plant for one year before determining upon the final method of purification to be adopted. Accordingly the plant, of 70,000 gallons daily capacity, was constructed in the spring of 1904, and Mr. George A. Johnson, of New York, was selected to direct its operations. Here the Columbus sewage and various methods of purification underwent a thorough study by the best chemists, bacteriologists and engineers that were available, at an expense of about $45,000. The final purification works were designed and constructed exactly in accordance with the recommendation of Mr. Johnson in his very complete and admirable report dated November 10, 1905 (see MUNICIPAL JOURNAL & ENGINEER for May 2, 1906).

SEWER TERMINALS AND MAIN PUMPING STATION

The accessory works and appurtenances for collecting and lifting the sewage, consisting of sewer terminals, railway spur for transporting materials, levees, pumping station and force mains, were commenced during the fall of 1904. The intercepting sewer and West Side main sanitary and storm sewers were extended and connected with the screen chamber at the north end of the pumping station. The station is a handsome pressed brick structure surrounded by a protective levee. It is designed to perform two separate and distinct functions: primarily to pump the sanitary sewage from the *entire city* through a 48-inch cast-iron force main to the purification works about 6,000 feet south; and, secondly, to pump a portion of the storm water from the West Side through a short 48-inch cast-iron force main into the river during a conjunction of a high flood stage of the river and protracted rainfall. The capacity of the station is 41,000,000 gallons in 24 hours, which can be forced to 50,000,000 in an emergency. The installation consists of three direct-connected Worthington centrifugal pumps and Reeves engines, each of 11,000,000 gallons capacity, and two of 4,000,000 gallons capacity; also three Babcock & Wilcox horizontal water-tube boilers of 150 horsepower each. The station is built to allow for 50 per cent future extension.

The screen chamber is divided into three compartments, one each for the East and West Side sanitary sewage and one for the West Side storm water. The storm water chamber is provided with vertical screens which are lifted by a block and chain attached to an overhead trolley, and the others with both screens and screen cages, the latter being lifted and lowered by

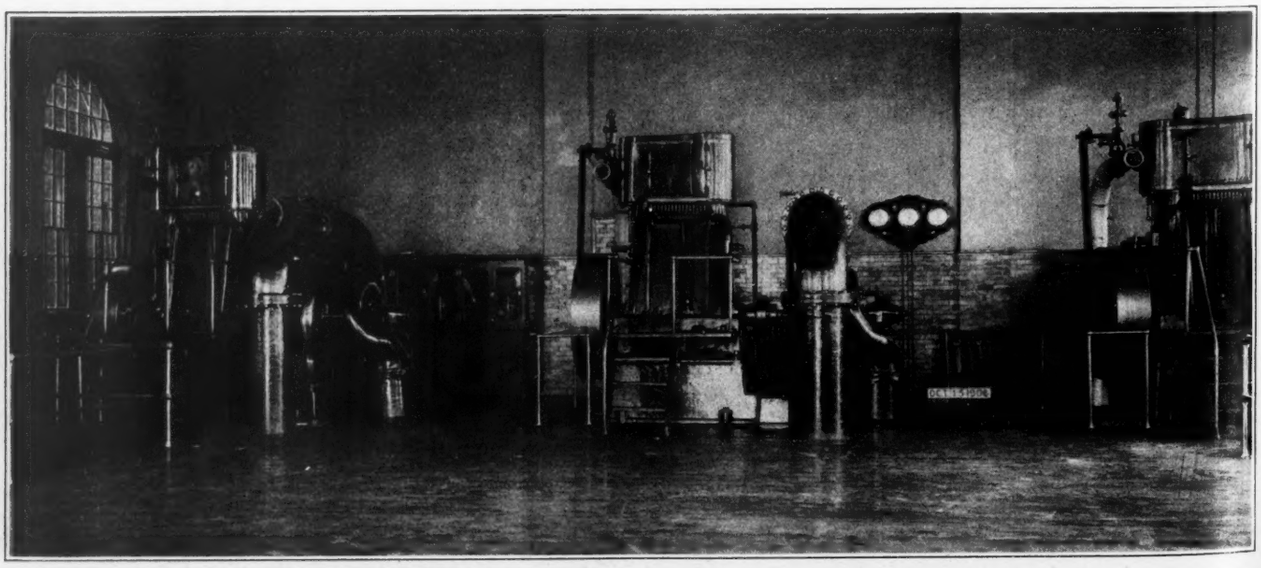


FIG. 3. INTERIOR OF ENGINE ROOM, MAIN SEWAGE PUMPING STATION

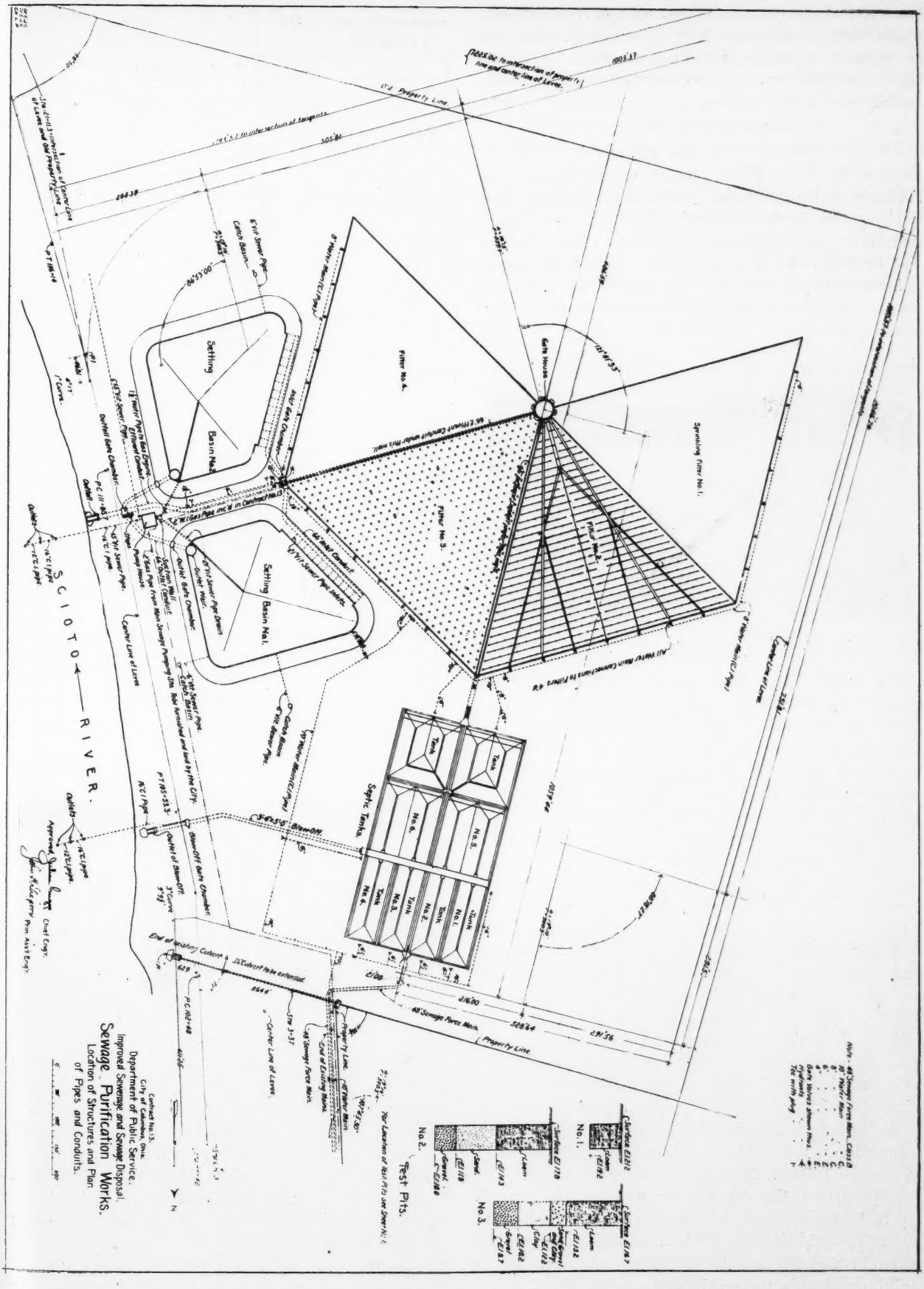


FIG. 4. SEWAGE PURIFICATION WORKS. PLAN SHOWING LOCATION OF THE SEVERAL STRUCTURES

means of steam-driven hoisting machinery. Each of the screen chambers is connected with an elliptical horizontal suction well from which the screened sewage and storm water is pumped into the force mains. The sewage is measured by a venturi meter in the force main, just outside of the building.

Purification Works

The site of the purification works is west of and adjacent to the Scioto River, about 6,000 feet south of the pumping station and about four miles south of the State Capitol. The works are surrounded by a levee about a mile long, enclosing about forty-six acres of land. The elevation of low water at this point, according to Columbus datum, is 6.00, high water 24.00, and the average elevation of the natural surface of the ground about 17.50.

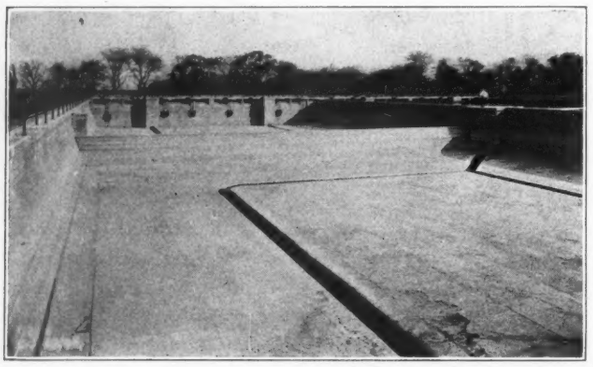


FIG. 5. SECONDARY SEPTIC TANK, LOOKING TOWARD COLLECTING AND DISTRIBUTING WALL

The works consist essentially of septic tanks, sprinkling filters and settling basins, all constructed of concrete and steel. The elevation of the septic tank floor averages 19.5, the filter floors 14.80 and the settling basin floors 6.75; the top of the septic tank walls is at elevation 32.92, the surface of the filters 20.15 and the average level of the surface in the settling basins 11.00. From these figures it will be noted at once that the manner of operating the plant will depend upon the stage of the water in the river; the settling basins are put out of commission by a four-foot stage and the filters by an eight-foot stage.

Septic Tanks.—The 48-inch force main already referred to enters a 66-inch circular conduit forming a part of the north wall of the septic tanks, through a bell-mouth at the center of the wall; this conduit runs the full length of the wall and communicates with each of the four primary tanks by four 24-inch circular sluice gates at about mid-depth of the tanks, as shown in Fig. 6.

Each of the primary tanks is 150 feet long and 56.5 feet wide on the inside neat lines, and has a capacity of 710,000 gallons. None of the tanks is covered. The four primary tanks communicate with the two secondary tanks by means of two sets of 24-inch sluice gates and a 60-inch circular conduit occupying the middle space in the three-story "collecting and distributing wall," parallel to the north wall. (See Fig. 8.) By means of the sluice gates the effluent from the primary tanks may be turned into either or both of the secondary

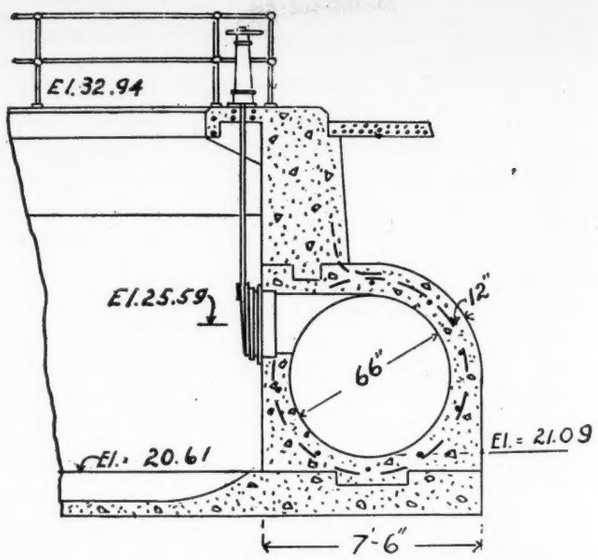


FIG. 6. NORTH WALL OF SEPTIC TANKS

tanks. Beneath the 60-inch distributing conduit is a 3 ft. 4 in. by 5 ft. egg-shaped sludge drain, which is connected with all of the tanks by inlets and carries the liquid sludge to the "blow-off gate chamber" on the bank of the river, from which it passes into a 16-inch cast-iron pipe laid under the river bed, with three risers and 8-inch, 10-inch and 12-inch flap valves near the center of the river, through which the sludge is discharged. Above the distributer is a rectangular channel which acts as a relief overflow conduit in case the rate of sewage pumped into the tanks is greater than that at which it is drawn therefrom, being connected with the sludge drain by four penstocks at the center of the collecting and distributing wall.

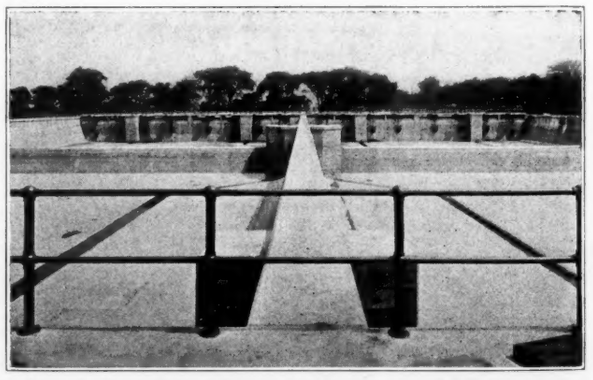


FIG. 7. SECONDARY SEPTIC TANKS. FROM CENTER OF SOUTH WALL

The secondary tanks, lying south of the collecting and distributing wall, are each 262 ft. long and 115.5 ft. wide, measured on the inside neat lines, and each tank is divided transversely into two basins by a submerged baffle wall 8 ft. high. Floating scum boards of cypress lumber, running the full width of the secondary tanks, are hinged to the baffle and south walls, the heads extending about six inches above the sewage, and rising and falling with the same. The walls and conduits of the tanks are provided with expansion joints consisting of reinforced tongues and grooves, spaced 50 feet. The tanks cover an area of 2½ acres and are surrounded by an earth embankment 10 feet wide on top. A total

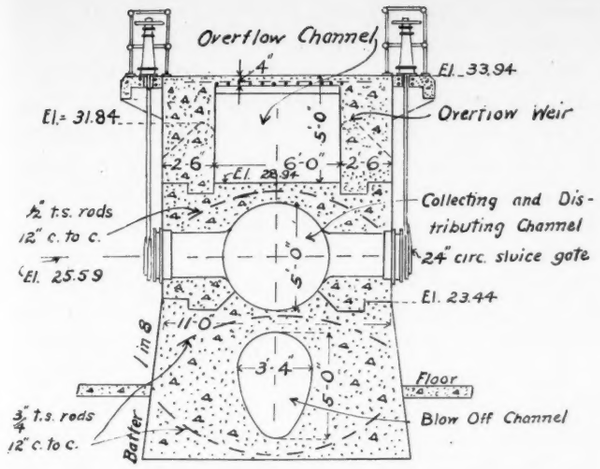


FIG. 8. SECTION OF COLLECTING AND DISTRIBUTING WALL

of 8,753 cubic yards of concrete were used in the tanks, at an average cost of $4.56 per cu. yd.

The capacity of each secondary tank is 2,600,000 gallons. The total capacity of the six tanks is 8,040,000 gallons. As the plant is designed for a daily flow of 20,000,000 gallons, the average period of flow for this amount would be about 9½ hours with all in use.

Influent Conduit.—Exit from the tanks is provided in the south wall, in the same manner and at the same elevation as the entrance through the north wall. The 66-inch conduit in the south wall enlarges into a bell-mouth at the center of the wall, forming the entrance to the 66-inch reinforced "influent conduit." This is an influent conduit only so far as it has reference to the gate house. It is about 625 feet long and lies under the dividing wall between filters 2 and 3. It serves as the base of the dividing wall, as well as of an elevated reinforced concrete walk from the septic tanks to the gate house. The settled sewage from the tanks is delivered at the "influent well" in the center of the gate house.

Gate House.—The gate house is located in the center of the filter area, which is composed of six equilateral triangles. It is circular in form, 38 ft. outside diameter. The substructure is built entirely of concrete and steel, while the superstructure is of brick with concrete floors and trimmings. The substructure is divided into a veritable labyrinth of compartments, communicating with each other by means of sluice gates. (See Fig. 10.) The influent well in the center is 15 ft. in diameter and about 25 ft. deep. Within this well, with floors six feet above that of the influent well, are located the two controller wells, elliptical in plan, the diameters being 6 ft. 6 in. and 7 ft.

Each controller well contains a specially designed controller, consisting of a brass discharge cone, pressure disc and shaft supporting a nest of weights which are picked up as the disc rises and dropped again as it falls. The controllers are designed to be adjustable, from a minimum of about 10,000,000 gallons to a maximum of

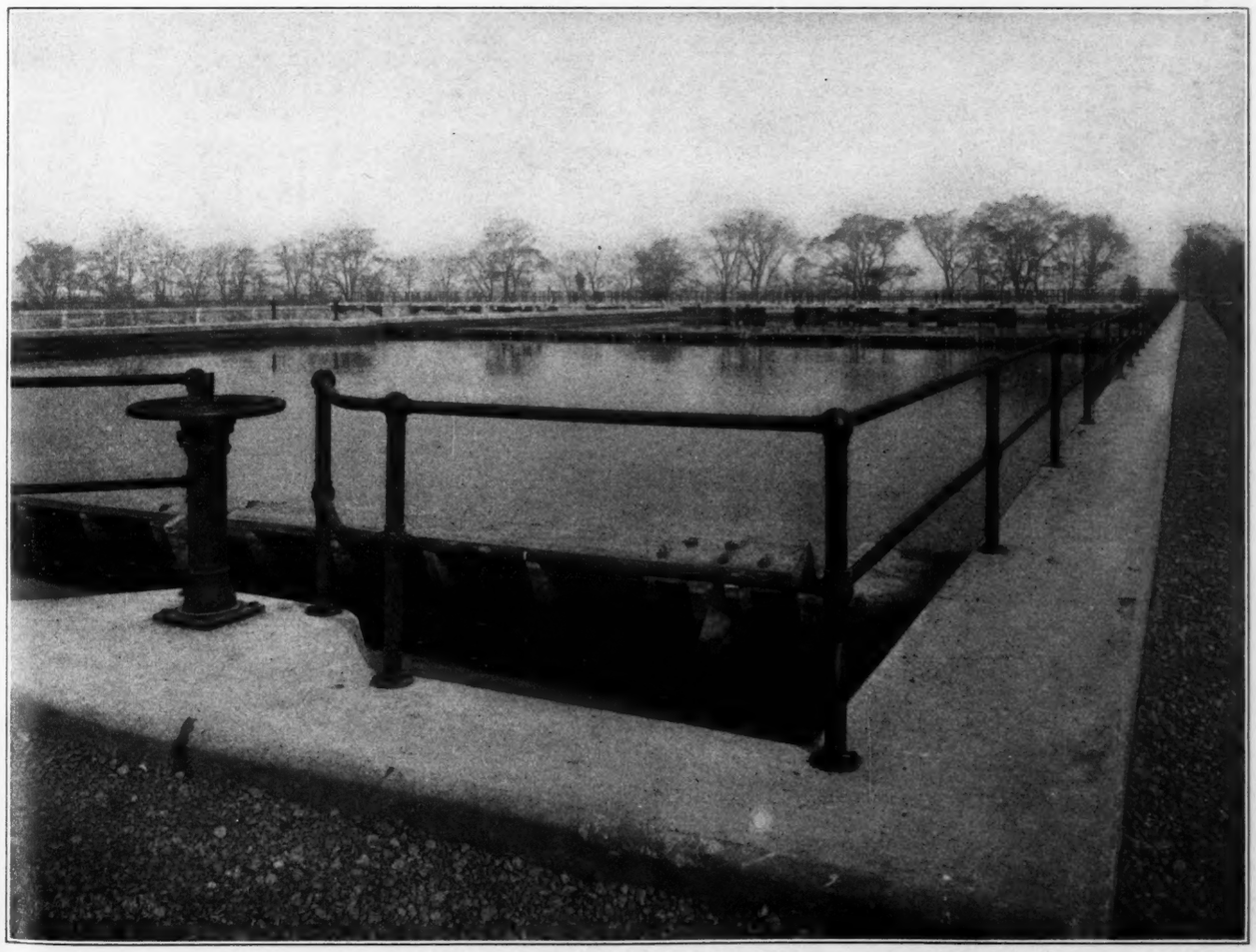


FIG. 9. SEPTIC TANK FILLED WITH SEWAGE. SHOWING FLOATING SCUM BOARDS

22,000,000 gallons in twenty-four hours. The object of the controllers is to maintain a constant rate of discharge from the septic tanks to the filters under the necessarily varying elevations of the surface of the tanks during twenty-four hours pumping. Should the amount pumped exceed that for which the controllers are set the excess will flow over a weir provided at the top of the wall between the influent well and the distributing well without passing through the controllers. The weir is 1.84 ft. lower in elevation than the overflow weirs in the collecting and distributing walls of the septic tanks, so that as long as the loss of head is less than this amount the overflow will occur in the gate house.

The well next outside of the influent and controller wells is called the *distributing well;* it is 3 ft. wide and 25½ ft. deep, running completely around the influent well, with which it is connected by a 30-inch circular sluice gate near the top, a 6-inch gate for draining at the bottom, and the overflow weirs already referred to. The controller and distributing wells are connected by 42-inch square sluice gates, through which the sewage normally reaches the distributing well.

The next chamber outside of the distributing well is called the *effluent well,* 4 feet wide, also running completely around. This well is 8 feet high, surmounted by twelve manhole chambers about 4 ft. by 4 ft. in plan, connected with the distributing well by means of 24-in by 36-in. sluice gates on one side and the 30-inch main distributers for the filters on the other. They are also connected with the effluent well by 6-inch gates to drain the chambers and distributers. The effluent and distributer wells communicate with each other by two 30-in. by 36-in. sluice gates at the bottom. These will only be used when the filters are cut out and the septic tank effluent must be by-passed directly into the effluent well. The distributing well is also connected with the main underdrains of the filters by means of 24-inch circular sluice gates and vitrified pipes, one for each filter, whereby the filters may be used as contact beds, filled from underneath. The effluent well connects with the

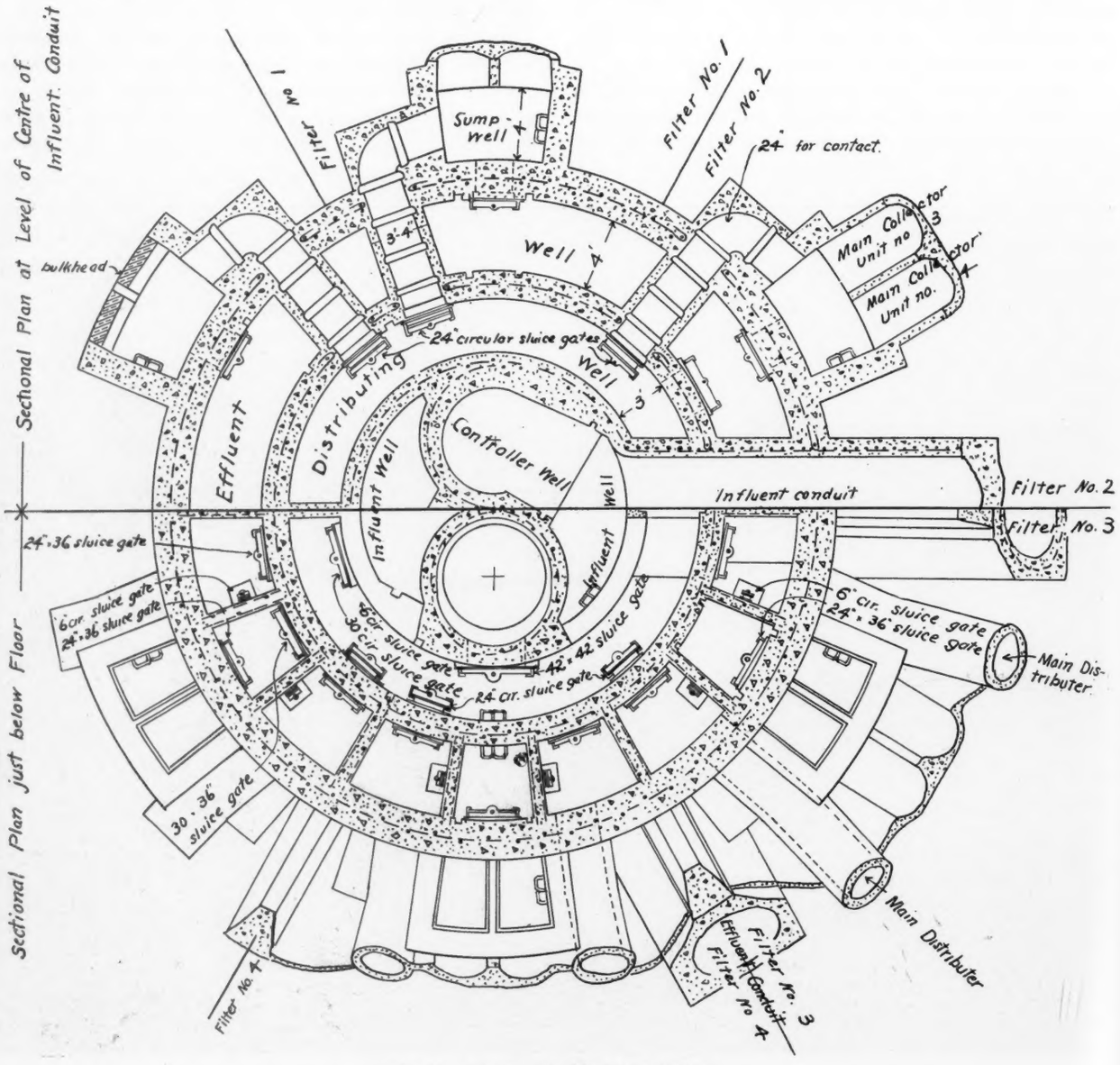


FIG. 10. SECTIONS OF GATE HOUSE

sump wells (about 4 ft. by 6 ft. in plan) in each filter, into which the main underdrains discharge, by 24 in. by 30-in. gates.

The normal route of the sewage through the gate house is as follows: From the receiving or influent well up through the discharge cones in the controller well, through the 42-in. by 42-in. gates into the distributing well; thence through the 24-in. by 36-in. gates into the manhole chambers and main distributers to the filters. The filtered effluent falls from the main collectors into the sump wells; thence through 24-in. by 36-in. gates into the effluent well, from which it passes into the effluent conduit.

All of the forty-two sluice gates are hand operated. They are located on the floor above the substructure. The second floor contains the chemical and bacteriological laboratories, store and toilet rooms and office. Water level indicators showing the head on the sprinkler nozzles; a depth recorder producing a continuous record of the elevation of the surface of the septic tanks, and a venturi meter register and recorder operated electrically from the pumping station, which were originally located on the operating floor, have been removed to the second floor.

Sprinkling Filters.—The six filters, four of which have been constructed for present use, radiate out from the gate house in the form of equilateral triangles, 505

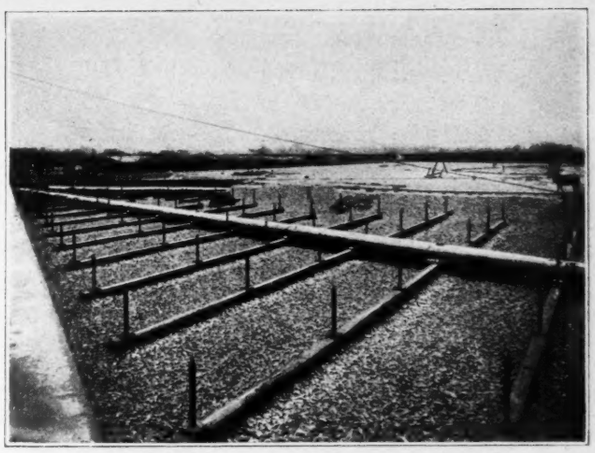


FIG. 12. FILTERS NO. 1 AND 2, SHOWING CAST-IRON RISERS AND FILTER STONE

feet 1¼ inches on a side, measured on the outside neat lines of the outside walls and center lines of dividing walls. Each filter contains 2½ acres and is divided into two units of 1¼ acres each by a ridge perpendicular to the outside wall, with independent control from the gate house when used as sprinkling filters. When worked as contact filters the entire filter will act as one unit, since the two half-filters are not separated by a wall, but simply by a ridge in the floor.

For each of the eight units there is one 30-inch reinforced concrete main distributer from the gate house

FIG. 11. FIRST STORY OF GATE HOUSE
Controllers had not been installed when this view was taken

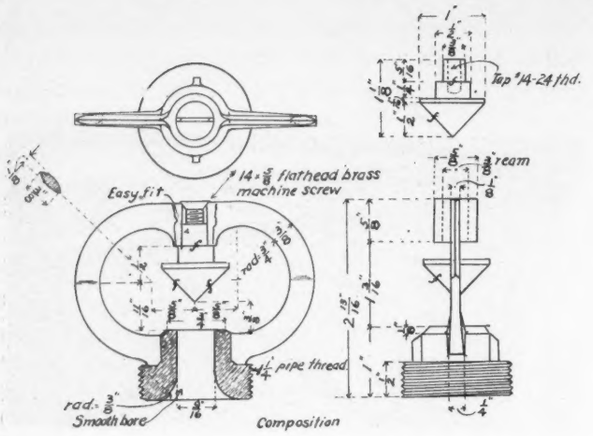


FIG. 13. COLUMBUS SPRINKLER NOZZLE

to the outside wall. The distributer is built above the concrete floor and supported at intervals of 13 feet 9⅞ inches by concrete walls of 10 to 12 inches thick running parallel to the outside wall and containing the 5-inch and 6-inch lateral distributer tiles. The main distributer practically bisects these laterals, thirty in number, which connect with it at or near the invert. The laterals are ordinary vitrified tiles laid in the concrete walls with cement joints, having every 15 feet 4 inches a vertical tee with 4-inch socket to receive the 3-inch cast-iron riser. The risers are leaded into the tee sockets and extend to the surface of the filters; they are staggered, each set of three forming an equilateral triangle 15 feet 4 inches on a side.

The sprinkler nozzles, which are made of brass, are screwed into the tops of the risers after the filter stone is placed (see Fig. 13). The orifice is 9-16 of an inch in diameter and is rated to discharge 13.5 gallons per minute under five feet head. There are 211 sprinkler nozzles per acre of filter, making an approximate rate of 4,000,000 gallons per acre in twenty-four hours, or 40,000,000 gallons for the entire plant if worked all at one time. As the filters are designed to rest one-half of the time, however, the total capacity is only 20,000,000 gallons.

The filter floor is of concrete 4 inches thick, and practically covered with 6-inch notched half tile of special design, bedded about ¼ of an inch into the concrete while it was soft. There are 130,782 lineal feet of lateral collector tiles in each filter, or about 100 miles in the entire plant. Each unit has two concrete main collectors 24 inches wide, converging into one 36-inch collector near the gate house. The laterals drain into these main collectors, the floor pitching toward them at the rate of about 1 in 60. The main collectors are covered with reinforced concrete slabs 4 inches thick and are supplied with manholes at short intervals for inspection and cleaning. At the head of each main

FIG. 14. VIEW OF FILTER NO. 4 FROM GATE HOUSE
Showing lateral collector, main and lateral distributers and covers over main collectors

distributer and collector there is a 4-inch blow-off connection with a 10-inch and 8-inch water main under a pressure of 70 to 75 pounds, for flushing purposes. The filtered effluent reaches the effluent conduit in the gate house by way of the main collectors and sump wells.

The filter stone has an average depth of about 5½ feet; the lower 10 inches of which is 3 inches to 4 inches, and the remainder 1¼ inches to 3 inches in size; all of the material being Ohio limestone. Great difficulty was experienced in securing stone free from fine material. By securing as many changes in the arrangement of the screens and chutes as the quarry owners would submit to, and the introduction of an air blast at the crusher, and by providing for inspection at the quarry as well as at the plant, a fairly satisfactory product was obtained. Altogether 80,125 cubic yards of filter stone were required, costing $1.57 per cubic yard in place.

Effluent Conduit.—The 66-inch effluent conduit which carries the filtered effluent from the effluent well in the gate house to the settling basins and eventually to the outfall at the river, does not operate under a head and is therefore not reinforced. It is of the same cross-section as the influent conduit and lies under the dividing wall between filters 3 and 4 to the "inlet gate chamber" at the intersection of the outside walls of these filters; continuing from this point between the settling basins and south of the pump house to the outfall gate chamber and thence to the outfall. Two 66-inch inlet conduits for the settling basins branch out from the inlet gate chamber and run along the west side of the basins, communicating with these through a series of 21-inch vitrified pipe branches. Each inlet is controlled by a 66-inch sluice gate.

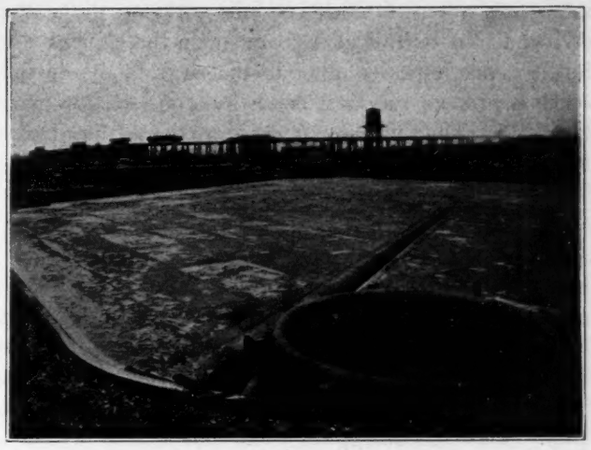


FIG. 15. SETTLING BASIN NO. I. SHOWING FLOOR, SLUDGE DRAIN AND OVERFLOW WEIR

Settling Basins.—These have a capacity of 2,000,000 gallons each and can be operated independently of one another if desired. They are 4 to 4½ feet deep and the average surface level is 5 feet above low water in the river. The floors are paved with 4 inches of concrete.

Exit from the settling basins occurs by way of circular concrete weirs of 9½ foot radius and 4.5 feet

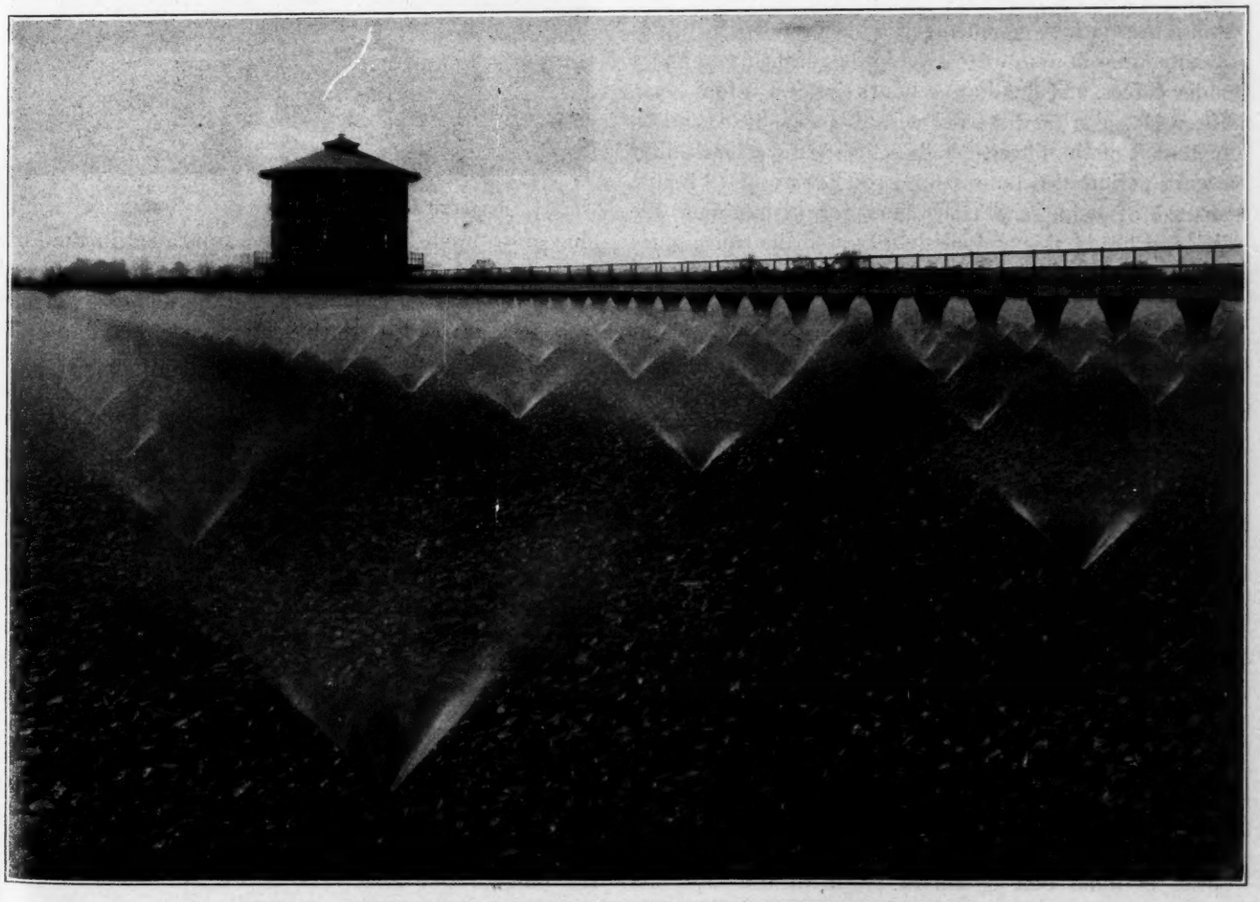


FIG. 16.—GENERAL VIEW OF GATE HOUSE AND FILTER IN OPERATION

above low water; 66-inch conduits carrying the settled effluent to the outfall gate chamber on the effluent conduit, whence it passes out into the river at the outfall, which is protected against floods by a 66-inch automatic flap valve. The total area covered by the settling basins is about four acres.

Operation

The purification works were placed in operation about the beginning of November, 1908, under the management of Mr. C. B. Hoover, chemist in charge. At first the filters were operated with a head of 5 feet at the sprinkler nozzles, using three filter units during the day and two during the night and shifting the units daily. This schedule gave each unit a rest period of two days and a work period of one day. The controllers were used to maintain the head. Under the 5-foot head the sprays did not touch and the areas between the circles remained dry unless there was a good wind. To overcome this the head was increased gradually to 7 feet, whereby an overlap of the sprays was secured. After considerable experimenting it was found that a constant head did not give the uniformity of distribution which was necessary for efficient operation, and plans are being considered for an electrically operated attachment to the controller shafts, whereby the head will be made to oscillate between 3 and 9 feet at short intervals. In the meantime the filters are being operated as follows:

The day is divided into four periods of six hours each. All of the filters are used during the twenty-four hours, in rotation; commencing with filter No. 1, this is operated two hours under a 3-foot head, then two hours under 6 feet, and finally two hours under a 9-foot head. Filter No. 2 is then started with a 3-foot head, and so on for all of the filters. This schedule gives each filter a work period of 6 hours and a rest period of 18 hours. Instead of using the controllers for maintaining the different heads, this is done by means of the sluice gates controlling the discharge from the septic tanks and the inlets to the main distributers.

At 3-ft. head the nozzle discharges about 11 gallons per minute; the radial reach is about 5 feet and the width of the wetted band 2 feet; at 6-ft. head the discharge is 14.35 gallons, radial reach 7½ feet and width of wetted band 2½ feet; and at 9-ft. head the discharge is 17.4 gallons, radial reach 10 feet and wetted band 3½ feet.

While it was found at the testing station, where only one sprinkler was used, that a crater of ice formed around the nozzle in midwinter, covering from 0 to 84 per cent of the total area covered by the spray (average for January 17 per cent), no such phenomenon occurred at the large plant during the past winter, and will probably never occur, as any tendency in this direction can be easily overcome by increasing the head so that the sprays will overlap.

The average results for the first five months of operation are as good as could be expected. It must be borne in mind that operation began at the most unfavorable time of the year, quite adverse to the development of bacterial activity, and that the results to date are absolutely no criterion of the eventual efficiency of the plant. It will be necessary to operate the works during at least one summer before data of any value in determining their efficiency can be made available.

The quantity of sewage pumped fluctuates between 10,000,000 and 14,000,000 gallons per 24 hours in dry weather, and is as much as 21,000,000 gallons in rainy weather, the excess being largely due to defective connections between the combined sewers and the main intercepting sewer. This trouble will need speedy correction.

In spite of the unfavorable conditions referred to, the filtered effluent is now practically non-putrescent, which is all that the plant is expected to accomplish. The settling basins are not designed to effect a further purification of the filtered effluent, but simply to improve its appearance by removing the suspended matter which scales from the filter stone after the rest period. The period of flow through the basins was designed to be about 2½ hours when only one basin is used.

Sludge is removed from the settling basins by pumping. For this purpose a centrifugal pump of 3,000 gallons per minute capacity, chain-driven by a gas engine of 50 brake hp. capacity, was installed in the little pump house. The basins drain toward the suction well through 21-inch vitrified pipes, and the sludge is pumped from here through 12-inch suction and 12 and 16-inch discharge pipes to outlets at the center of the river. of the same design as the blow-offs for the septic tank sludge. The best time for cleaning out the tanks and settling basins is when the stage of the river is between 5 and 10 feet, the velocity and volume at such times being sufficient to carry the sludge downstream and dissipate it without causing offense or pollution of the stream.

FIG. 17. SETTLING BASIN FOR EFFLUENT. SHOWING PUMP HOUSE

When the septic tanks were cleaned out in February, there was between two and three feet of liquid sludge in the primary tanks, besides considerable mounds of grit piled up at the receiving ends, while the depth of sludge in the secondary tanks was only two or three inches, requiring no attention whatever.

The force necessary to operate the purification works consists of a chemist in charge, assistant chemist, two laborers and a night man. It requires about one-fourth the time of one man to keep the sprinklers in good working order.

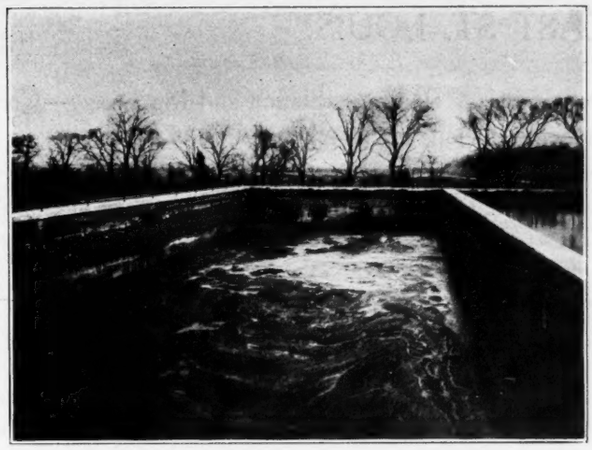


FIG. 18. PRIMARY TANK NO. I EMPTIED FOR CLEANING. SHOWS SLUDGE, AND PILE OF GRIT AT FURTHER END

The Columbus plant was designed under the direction of Messrs. Hering & Fuller, of New York, consulting engineers, and Mr. Julian Griggs, of Columbus, chief engineer. Mr. John H. Gregory, of New York, was engineer of design and construction. The writer was resident engineer in immediate charge of construction. Lines and grades were given by Mr. Thos. H. Brannan, assistant engineer, and Mr. A. Stellhorn, assistant engineer, was chief inspector.

The purification works, exclusive of the site, cost approximately $440,000; all other works approximately $678,000, exclusive of land.

The writer acknowledges his indebtedness to Mr. C. B. Hoover for the data relating to operation which he kindly furnished.

THE USE OF CATCH BASINS

IN many cities of the country it is the practice to place catch basins at all street water inlets, without ever raising the question as to whether it would be more desirable, or equally advantageous and certainly cheaper, to omit the catch basin and provide a plain inlet leading directly to the sewer. By blanks which were sent out in collecting data for this issue, we endeavored to learn to what extent this was the practice throughout the country. Before giving the figures obtained from this we present a brief statement made by Andrew J. Gavett, City Surveyor of Plainfield, N. J., as partly explaining the reasons for omitting catch basins, under certain conditions at least. Mr. Gavett states:

> We are using plain inlets except in cases where the streets are of such character that considerable washing of sand, fine stone, gravel, etc., into the storm sewers would probably occur. The only places, so far, where deposits have formed in the storm sewers are in the upper ends of the sewers, where the latter have been continued of a larger size than actually necessary, in order to permit a man to pass through them, the deposits seeming to have been mainly caused by the velocity of the water in the upper block being checked by the large inflow at the inlets next lower down the sewer.
>
> We have been using inlets on some of the sewers for a number of years, and have had no trouble in stoppage of sewers. We believe that nearly as much sand is carried into the sewers from catchbasins as from inlets; as in the former the water is probably sufficiently agitated during the storm to keep the lighter particles, at least, of sand in suspension. Furthermore, the material removed from catch basins seems lergely composed of horse droppings and other street refuse rather than of sand and stone.

The last of Mr. Gavett's statements offers an additional objection to catch basins, in that much of the matter which remains in them is putrescible, and if it is not removed at once (and we doubt if there are many cities where this is done), putrefaction and the resultant odors make the basins a nuisance.

Of 28 New England cities, 25 reported the use of catch basins, and two that they were not used, one reporting that they were used more or less. In the Middle Atlantic States 26 reported the use of catch basins, one that they were not used, and 5 that they are used to a certain extent.

In the Southern States 8 reported the use of catch basins, one that they were not used, and one that they were used on parts of the inlets only. In the Ohio Valley 42 reported the use of catch basins, 6 that they were not used, one that they were used on about one-third of the inlets, two that they were used on about one-half of the inlets, and one that the old basins had them, but that they were put on none of the new ones. In the Upper Mississippi-Missouri district 36 cities reported their use, 3 that they were not used, and 9 that they were used on part of the inlets. In the Lower Mississippi and Gulf district 4 reported that they were not used, and one that they were. In the Rocky Mountain district four reported that they were used and one that they were not. In the Pacific States the 6 cities which answered this question all reported the use of catch basins.

In a few instances explanations were given as to the conditions under which catch basins were and were not used; one city reporting that they were placed at the foot of steep streets; another that they were used on streets having a grade flatter than 5 per cent, but not on streets having a steeper grade. It is probable that these two plans of location were based, the one upon the idea that there would be more sand and heavy matter carried along by water from the steep hillside, the other that a steep surface grade meant a steep sewer grade and that the latter would furnish sufficient velocity to transport any material entering the sewer, which would not be the case on the flat grades. A number of cities reported that they were abandoning the use of catch basins in many, if not all, locations; and we believe that the best practice recognizes that their use is not always advisable, entirely aside from the fact that both their construction and maintenance involve considerable expense.

INVESTIGATING SEWAGE DISPOSAL PLANTS

A COMMITTEE of the Common Council of Trenton, N. J., is to visit a number of sewage disposal plants during the week of May 3 to 9, these to include Lawrence, Providence, Worcester, Saratoga, and others. It has already visited several plants, including the one at Reading which impressed the members very favorably. Of the six members, the only engineer, we believe, is City Engineer Abram Swan. Such trips by non-experts are more or less common, but an unusual feature of this one is that photographs are to be taken or otherwise obtained and used for preparing lantern slides by which the report to Council will be illustrated.

SEWERAGE OF EAST ST. LOUIS

Gravity Outlet, with Pumping During High Water—Description of Pumping Station and Machinery—Concrete Sewers Both With and Without Reinforcement—Details of Sewers and Cost of Same

With the recent letting of the contract to the O. F. Dunlap Company, of Edwardsville, for $710,266, has begun the final chapter in the securing of adequate sewer facilities for East St. Louis, Ill.

The present system, which serves only the heart of the city, was outgrown many years ago and soon after the present Mayor, Silas Cook, first assumed office in 1903 plans were started to properly care for the whole city. A sewer drainage district was laid out, and plans prepared for sewers in this district and council passed the necessary ordinances to make the work effective. Since the project was started additional territory has been annexed to the city, but only that part included in the heavy line in the accompanying plat is in the sewerage and drainage district. Objections were raised, based upon this limitation, and long and wearisome litigation delayed the work until a final decision was reached late in 1908, which made it possible to undertake the actual construction.

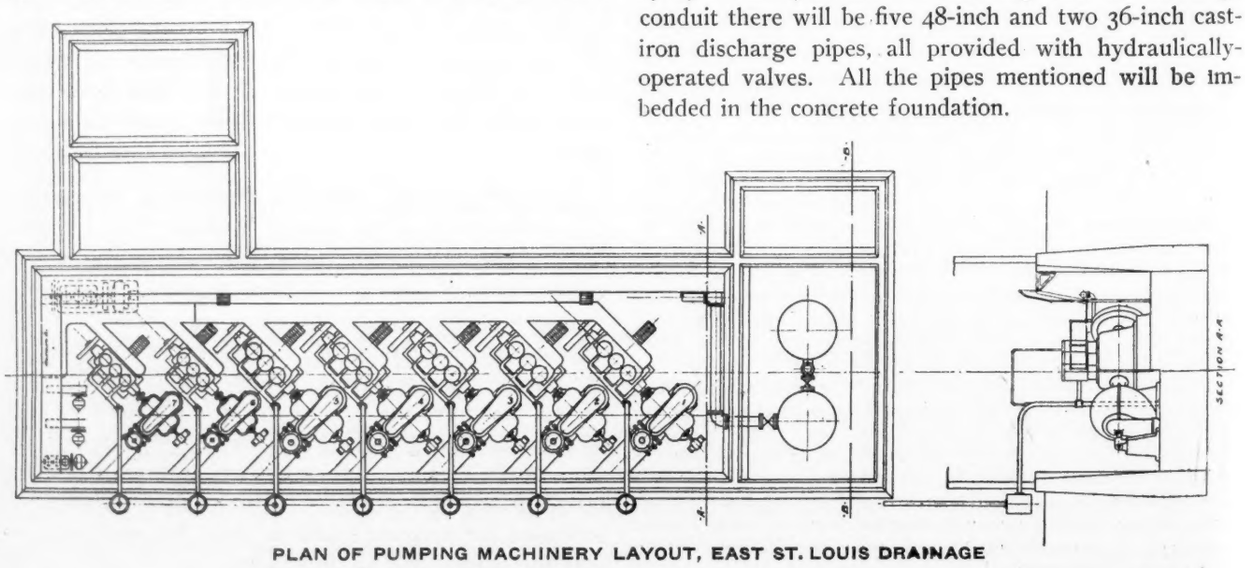
Mr. E. G. Helm, former City Engineer, prepared the first plans, and these have been little changed by his successor, Mr. W. J. Crocken.

East St. Louis is built on lands which used to be subject to annual inundations from the Mississippi River. Now most of it has been raised by filling so that it is above the level of any but extremely high floods; from which the city is further protected by levees. During most months in the year the river is at such a stage that a system of natural drainage for the sewers could be utilized; but during the rise, which occurs usually in May and June of each year, the sewers would be flooded unless some means were provided for pumping the sewage. In the plans adopted an outlet will be provided so that the sewage can flow to the river unimpeded at ordinary times, but in high stages of the river the sewage is by-passed to the river through a sewage pumping station and force mains. From the pumping station to the river the same conduit serves as an outfall sewer and force main.

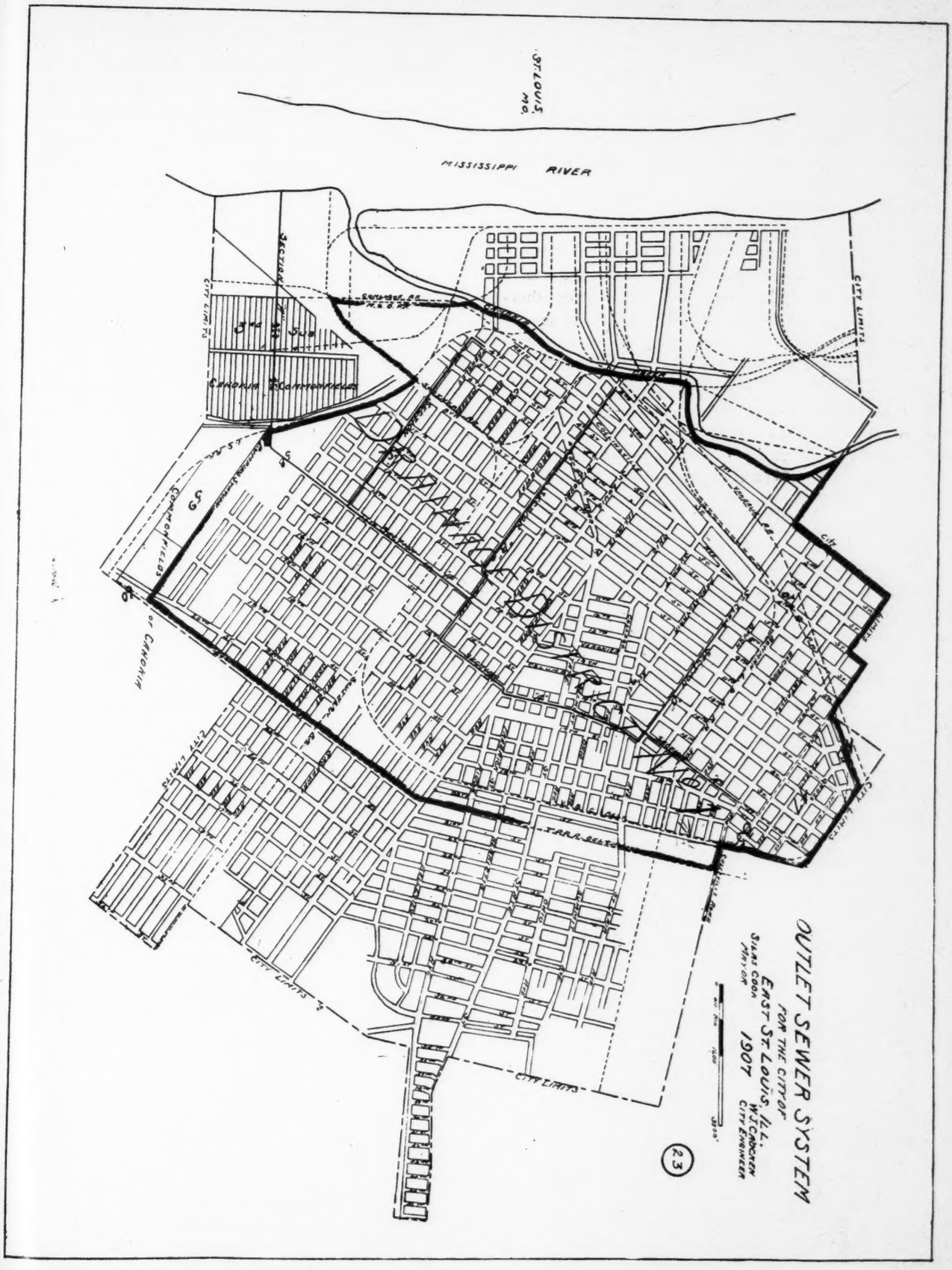
The Pumping Station

The pumping station is located in the southwestern section of the city, as shown on the accompanying plan, and is about one mile from the river. The pumping station will consist of a main building containing the machinery, 36 feet 11 inches by 136 feet, with a wing containing the office, lavatory, etc., 29 feet 11 inches by 36 feet, all outside dimensions. Excavations for the main building will be made to elevation 73, while the floor of the engine room will be at elevation 85, and the floor of the office, which is at the same level as the top of the foundation wall, will be 107. The superstructure of the building will be of common red brick, and the trimmings will be of Bedford limestone. Steel roof trusses and purlins will support yellow pine roof sheeting. This will be covered with heavy water-proof roofing paper on which will be laid a slate roof. A gallery made of cast-iron plates will run the whole length of the engine room at the office floor level. This will be connected with the operating platform by two stairways. All floors except those of the office will be of concrete.

The main outfall, used except at high water, passes along one side of the building while the by-pass passes along the other. When pumping is necessary the outfall sewer is shut off from the river and that section next the pumping station serves as a suction well. Connecting this with the pumps (to be described later) are ten cast-iron suction pipes 36 inches in diameter and four cast-iron suction pipes 24 inches in diameter, two for each pump. The 36-inch pipes are provided with 4,000-pound wedge gate valves designed to stand a hydraulic pressure of 30 pounds. These are to be operated by hydraulic cylinders. Connecting with the discharge conduit there will be five 48-inch and two 36-inch cast-iron discharge pipes, all provided with hydraulically-operated valves. All the pipes mentioned will be imbedded in the concrete foundation.



PLAN OF PUMPING MACHINERY LAYOUT, EAST ST. LOUIS DRAINAGE



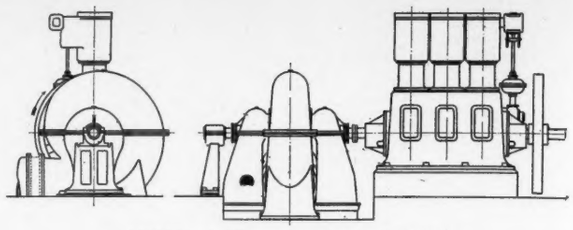
EAST ST. LOUIS, SHOWING DRAINAGE DISTRICT

Of special interest in the foundation is the provision for a steel shell in the walls of the engine pit. This extends from elevation 77.5 to elevation 98, and is intended as both a reinforcing and a water-proofing. This shell is to be made up of ¼-inch steel plates, single riveted at all joints. It is to be stiffened with six horizontal rows of 2½ x 2½ by ¼-inch angle irons, equally spaced. At points where pipes pass through this shell an angle iron is to be bent around the pipe and riveted to the shell, and the joint between the pipe and angle iron is to be caulked with lead.

Machinery

The pumping equipment will consist of five drainage pumps and two sewage pumps. The two sewage pumps will take care of the dry weather flow, and the others are required for rain water discharge. The engines are all three-cylinder vertical single-acting gas engines, with cranks set at 120°. They are all supplied with water-cooled jackets. Both inlet and exhaust valves are of the single-beat poppet valve type, made of forged steel and operated from an auxiliary camshaft. The engines are designed to start with compressed air and will be furnished with mechanically-operated make-and-break igniters. Exhaust pipes will be carried to mufflers outside the building.

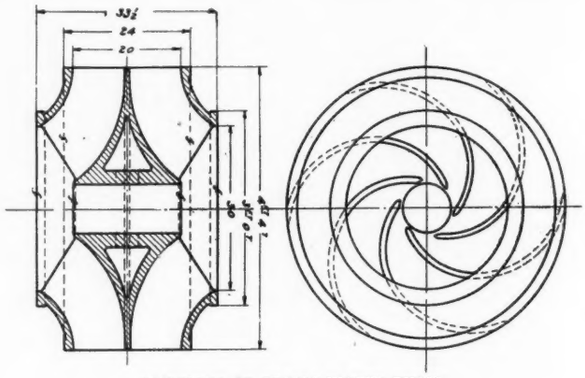
The five drainage pump engines are to be of 275 b.h.p. each when supplied with gas containing 650 B.t.u. per cubic foot, and running 195 r.p.m. A governor is to be provided which will permit of changing the speed, while



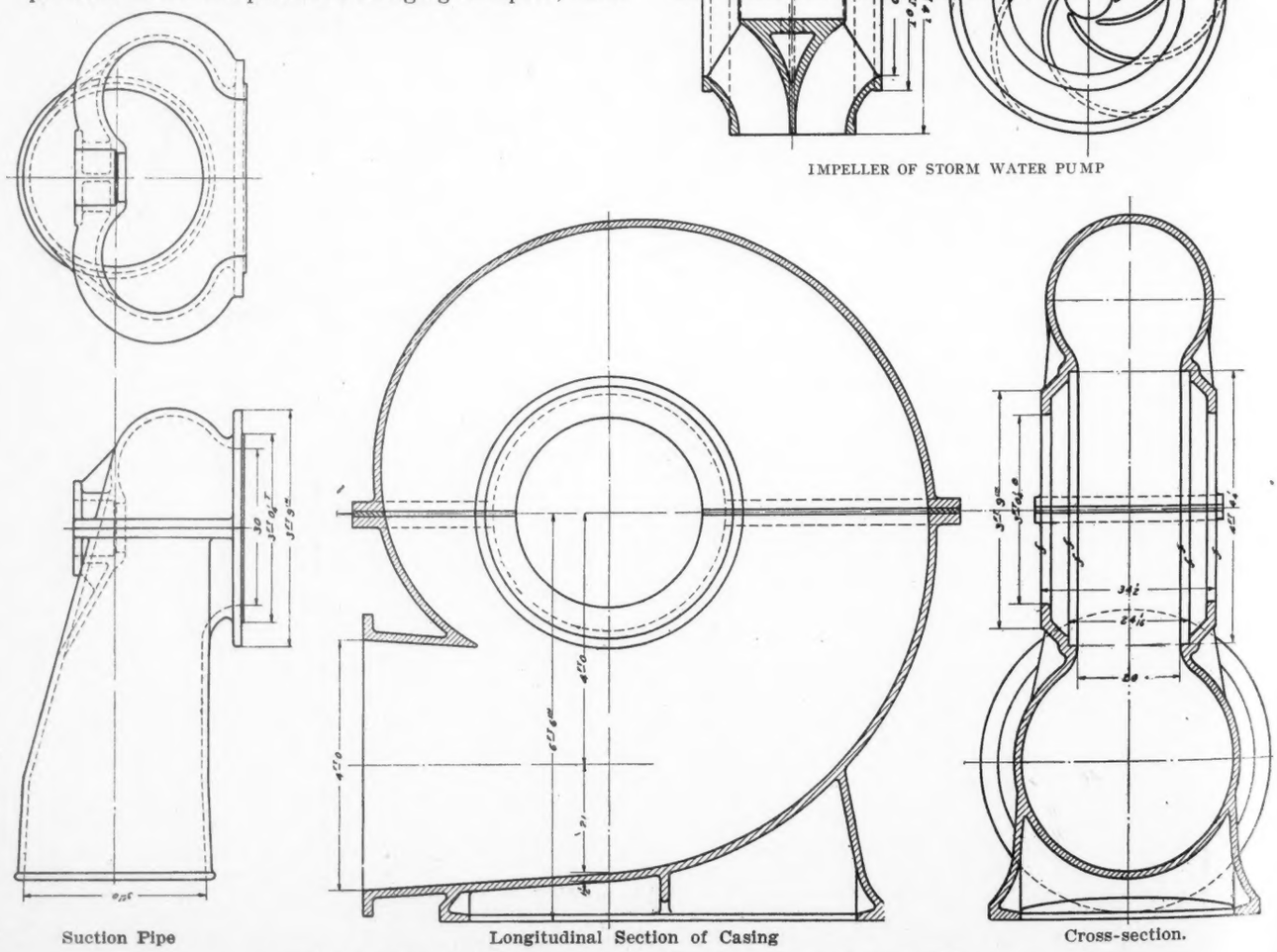
STORM WATER PUMP, EAST ST. LOUIS
Sewage pumps the same but smaller.

running, between the limits of 75 and 200 r.p.m. This governor operates by controlling the amount of the explosive mixture. These engines will have cylinders 18 inches in diameter. The pistons will be 36 inches long and have a stroke of 22 inches. The shafts are to be of forged steel 10 inches in diameter and 17 feet long, connected by bolted flanges to the pump shafts. Fly wheels nine feet in diameter and weighing four tons are to be keyed to the shafts.

The pumps are to be centrifugal, of center suction type with peripheral discharge. Two suction inlets, one on each side, are to be 36¼ inches in diameter, while the



IMPELLER OF STORM WATER PUMP



Suction Pipe — Longitudinal Section of Casing — Cross-section.

STORM WATER PUMP CASING AND SUCTION PIPES, EAST ST. LOUIS

discharge is 48 inches in diameter. The pump casing is to be of cast-iron 1½ inches thick.

The two sewage pumping engines will be of the same type as the others, but will have pistons 14 inches in diameter, 24 inches long and 18-inch stroke. They will be expected to develop 175 b.h.p. at 240 r.p.m., and will be provided with governors so that the speed may be regulated anywhere between 100 and 240 r.p.m. The shafts will be 7½ inches in diameter and 14 feet long, and connected to the pump shafts in the same way as the others. The fly wheels will be seven feet in diameter and weigh three tons.

A similar engine, of 50 h.p. capacity when operating at 300 r.p.m., is to be direct-connected to a 30-kw. direct-current generator. The shaft is to be five inches in diameter and 12 feet long. This is to be provided with two fly wheels 54 inches in diameter, weighing 1,400 pounds. The piston will be nine inches in diameter and have an 11-inch stroke. The governor to be provided with this engine must not allow a greater speed variation than 6 per cent between no load and full load.

The generator is to furnish 240 amperes at 125 volts when running at 300 r.p.m., and is to have an efficiency of 90 per cent between three-fourths and full load. It must be capable of operating at 25 per cent over load for two hours without a greater increase in temperature than 40° C.

A two-panel switchboard and the necessary electric circuits for lighting, for the crane and for the air compressors, are to be furnished.

As it is expected that the drainage pumps will have to be operated but a small portion of the time each year, provision is made for only a 500-h.p. pressure gas producer, which will furnish gas enough to run the other engines. When more gas is needed than this will furnish, it will be obtained from the gas company.

The specifications call for a producer which shall have an efficiency of not less than 75 per cent when supplied with anthracite coal containing not over 12 per cent of ash and containing not less than 13,500 B.t.u. per pound. Twelve thousand B.t.u. per hour shall be considered a horsepower, and a test run of 48 hours is to be made to show that the producer will develop 500 h.p. The gas during the test must show between 120 and 150 B.t.u. per cubic foot at a pressure of three inches of water. The necessary auxiliary apparatus is to be provided.

There is also to be a two-stage air compressor with cylinders eight and four inches in diameter, and operated by a 15-kw. 110-volt direct-connected motor. This is to deliver air to two systems of air tanks having a total capacity of 250 cubic feet. Each system will be made up of six tanks made from 16-inch welded steel tubes 15 feet long with dished heads. The air pressure in these tanks will be 200 pounds.

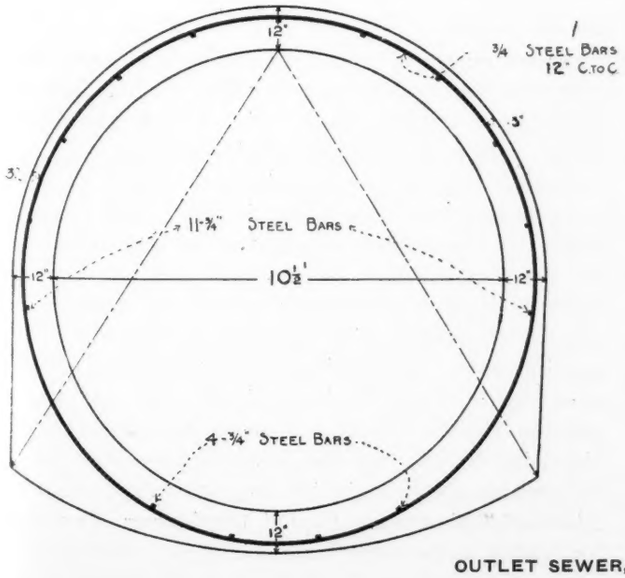
There will also be installed two vacuum pumps connected to 10 kw. 110-volt direct-connected motors. These pumps connect to a common five-inch vacuum main, which in turn is connected to the casing of each of the drainage and sewage pumps. The vacuum pump is to be capable of maintaining a 10-inch vacuum.

A 10-ton crane, which spans the engine room, is provided for handling the machinery. This is to be operated by three electric motors.

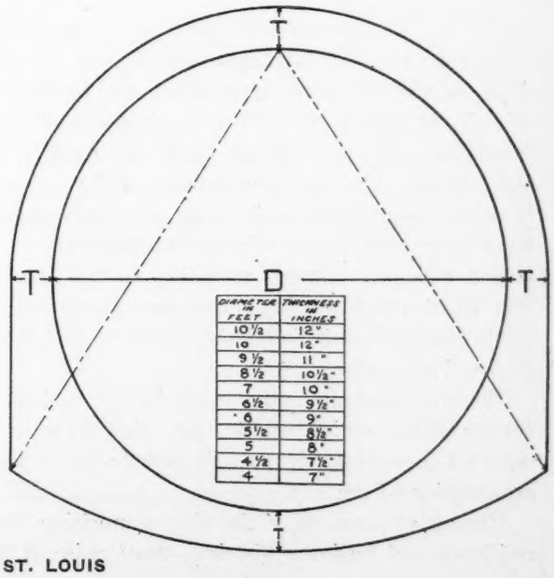
Sewers

The concrete sewers are all of the same shape, having an exterior of horseshoe form, with the invert the segment of a circle instead of flat, while the interior is circular. No sewers are reinforced except that from the pumping station to the river, which section, 5,650 feet long, is to be reinforced with ¾-inch milled steel rods. The rods used as circular bands will be placed 12 inches on centers. Those used for longitudinal reinforcement will be placed as follows: Four in the in-

SECTION WITH STEEL REINFORCEMENTS



SECTION WITHOUT REINFORCEMENTS.



DIAMETER IN FEET	THICKNESS IN INCHES
10½	12"
10	12"
9½	11"
8½	10½"
7	10"
6½	9½"
6	9"
5½	8½"
5	8"
4½	7½"
4	7"

OUTLET SEWER, EAST ST. LOUIS

vert over the thinnest section, none at the points of the horseshoe, and 11 in the arch starting just below the spring line on either side and being equally spaced. The bands and longitudinal rods are to be firmly tied together with steel wire. The reinforcement is to be placed approximately three-fourths the distance from the interior to the exterior sides of the shell. The thicknesses of concrete specified are as follows:

Diameter	Thickness	Diameter	Thickness
10½ ft.	12 in. reinforced	6 ft.	9 in.
10 ft.	12 in.	5½ ft.	8½ in.
9½ ft.	11 in.	5 ft.	8 in.
8½ ft.	10½ in.	4½ ft.	7½ in.
7 ft.	10 in.	4 ft.	7 in.
6½ ft.	9½ in.		

All concrete used in the construction of the unreinforced sewers will be mixed in the proportion one part Portland cement, two and one-half parts sand and five parts screened crushed limestone. The proportions for the reinforced section are one, two and four. All concrete is to be of the consistency known as wet concrete, and is to be tamped to position in layers not more than six inches thick. Where curves occur the line of the sewer is to be on a radius not less than three and one-half times the diameter of the sewer. Part of the manholes are to be of concrete and part of brick. The grade established for the outfall sewer is very flat, being only .064 per cent, which is also the grade to be used for the larger sized main sewers, all of which are comprised in section A. Section B, consisting of six-foot down to four-foot sewers, will have a grade of .08 per cent. Section C has the same grade, while section D has a grade of .15 per cent.

A special manhole and gate house is to be built at the junction of the discharge sewer with the main outfall. This is to control the by-pass previously mentioned. The gate is to be 11 feet 3 inches in diameter. The design is to be safe for a hydraulic head of 27 feet. The gate will slide in machined cast-iron ways, and a similar set of ways will be provided in which timber may be inserted in case the face is damaged. The gate will be operated by a 10-kw. 110-volt 14 d. c. motor.

One of the interesting features of the project is that the two lowest bids were so near the engineer's estimate. The comparison is given in the accompanying table. Too often the estimates and the cost are widely separated.

Comparison of Estimate and Two Lowest Bids

Price Per Linear Foot	Eng. Est.	Low Bid	Second Lowest
4 ft. concrete	$5.50	$6.40	$7.50
4½ in. "	6.50	7.60	7.75
5 ft. "	8.25	7.95	8.00
5½ ft. "	10.00	9.49	10.50
6 ft. "	11.25	10.77	12.25
6½ ft. "	13.25	12.75	13.50
7 ft. "	14.50	13.40	15.00
8½ ft. "	19.50	18.72	19.00
9½ ft. "	21.50	19.50	21.75
10 ft. "	22.50	21.00	23.00
10½ ft. reinforced	33.00	29.35	31.25
3 ft. pipe	5.25	6.85	7.25
Totals—			
Section 1.....		155,555.00	165,625.00
Section 2.....		124,525.00	129,075.00
Section 3.....		125,510.45	135,783.75
Section 4.....		52,947.50	57,702.50
Section 5.....		49,499.70	54,550.00
Pumping station and outfall sewer		64,489.00	65,000.00
Pumping machinery		134,740.00	125,000.00
Total	$719,687.75	$710,266.65	$732,736.25
		1.4% low	1.8% high

The contract calls for the completion of the work in two years. Work will probably not be started until after the high stage of the river for the present year. The main outfall and pumping station will first be built, after which there will be little interference by water with the rest of the work.

Mr. E. T. Adams was consulting engineer on the machinery, and Prof. A. N. Talbot acted in the same capacity on the sewer and foundation design.

SALT LAKE CITY SEWAGE OUTLET AND PUMPING PLANT

Twenty-four Inch Wood Stave Outlet Sewer—Centrifugal Pumps, Electric Motor and Producer Gas Plant of One Hundred and Fifty Horse Power—Plant Now Nearing Completion

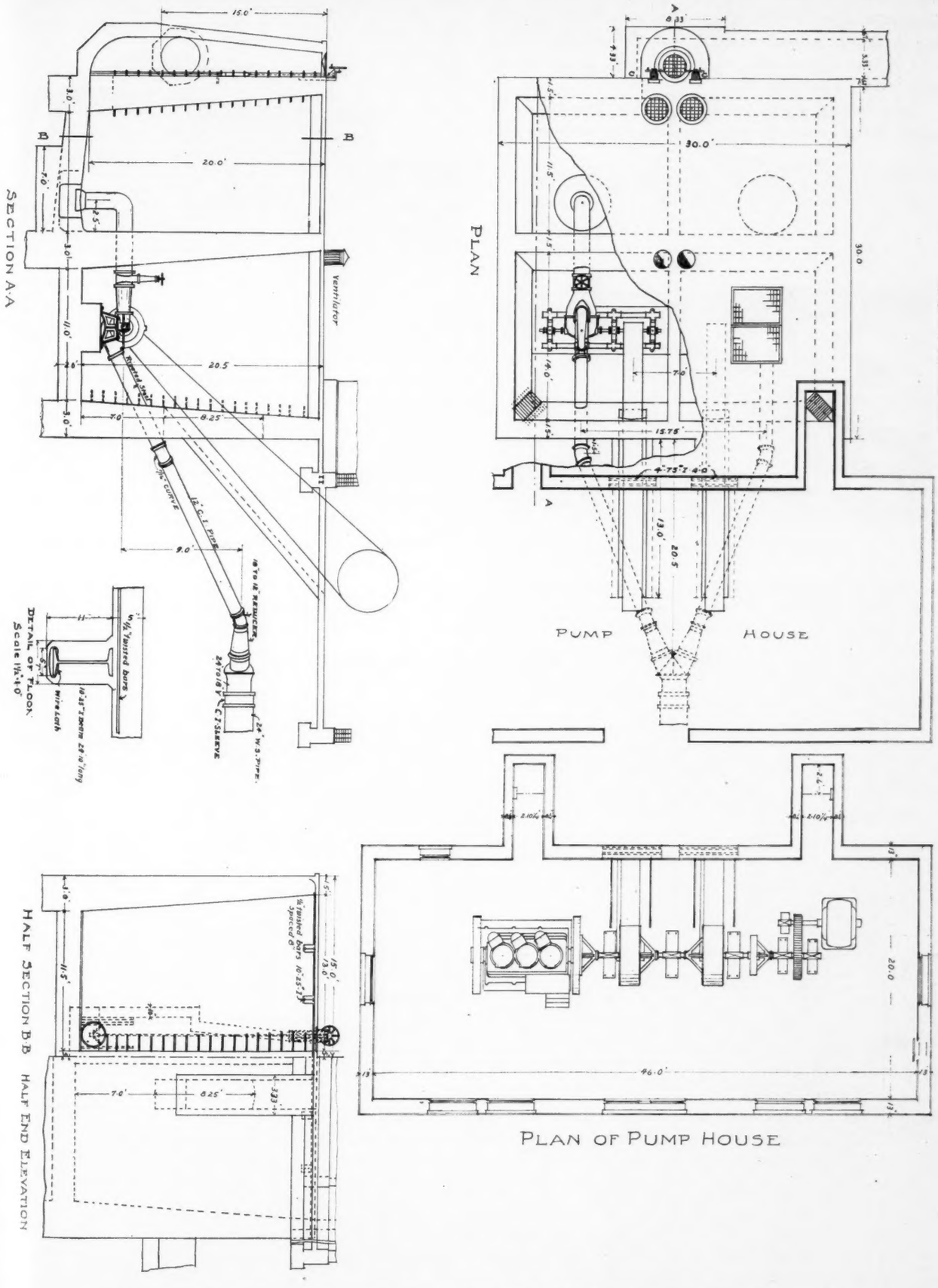
By LOUIS C. KELSEY, City Engineer

Salt Lake City is situated at the foot of the west slope of the Wasatch Mountains, the residence portion of the city, both on the north and east portions, extending for some distance onto the foothills of the main range. The business portion of the city extends from the foot of the main slope westward to the railways along the banks of the Jordan River, a thinly settled residence district extending to the edge of the Salt Flats, which are but a few feet above the normal surface of the Great Salt Lake, of whose bed they were at one time a part.

The only drainage outlet from the city is through the Jordan River, which empties into Salt Lake at a distance of approximately 10 miles northwest of the business section of the city.

The upper portions of the city, comprising the main residence and business districts, have enjoyed the use of a sewerage system to a greater or less extent since 1889, the first sewers being installed at that time, the outlet pipe extending from Main street to the Jordan River, a distance of approximately two miles.

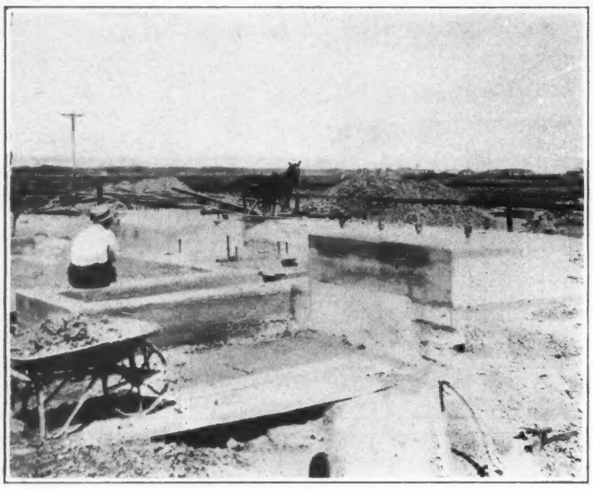
In 1893-1895 the main gravity outlet sewer was constructed northward from the city into Davis County, where the city purchased 500 acres of land to be used for the disposition of the sewage. This sewer is 7.8 miles in length, the lower 3.4 miles from North Ninth street to the outlet being 64 inches in diameter. This gravity outlet was sufficiently low to provide for the main residence and business district, but was at too great an elevation to provide for all that portion of the city lying to the west and south of the outlet sewer. To provide for this district an intercepting sewer 3.9 miles in length was constructed, terminating in a pumping station at Seventh North and Eighth West streets.



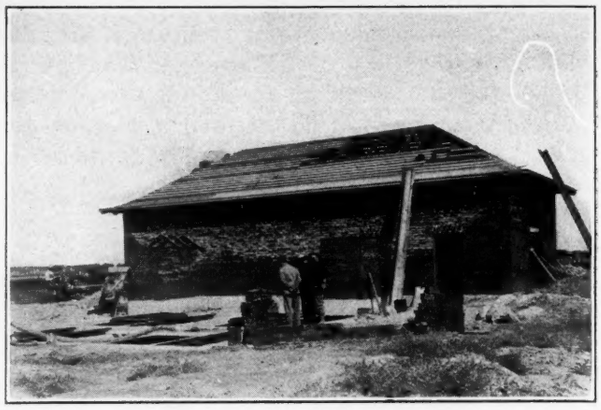
PLANS AND VERTICAL SECTIONS OF PUMPING STATION, SALT LAKE CITY

The pumping station is connected with the gravity outlet sewer by means of a 24-inch continuous wooden stave pipe, 4,525 feet in length, and a cast-iron pipe 78 feet in length, a total of 4,603 feet, the cast-iron being used at the upper end, where the pipe passes at an angle under a railway track.

The pumping station consists of two valve pits, two pump pits, a power house, a suction gas producer station and an oil house. The machinery consists of two 12-inch centrifugal pumps, one electric motor, one gas engine and one gas producer plant.



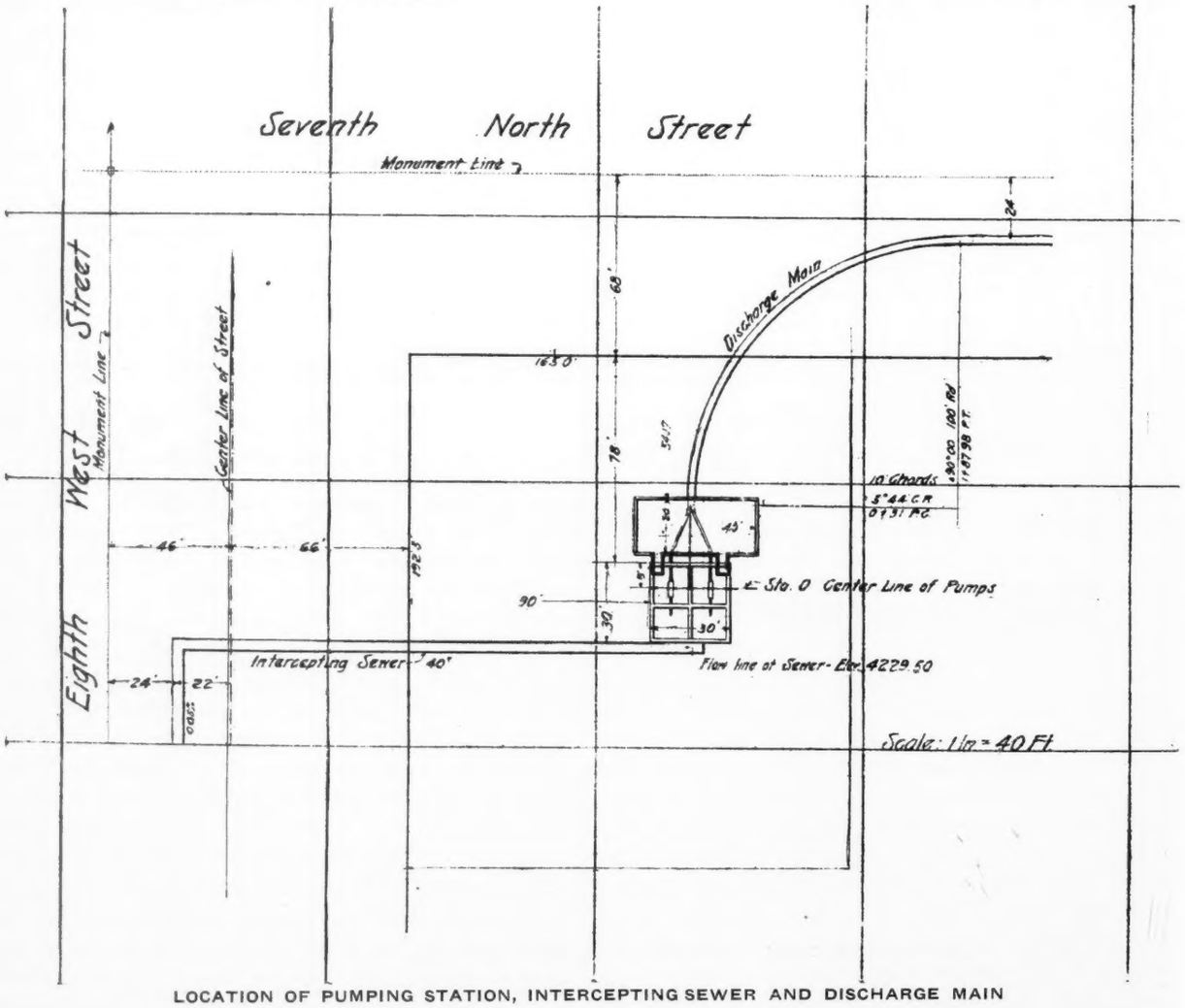
CONCRETE FOUNDATIONS FOR MACHINERY



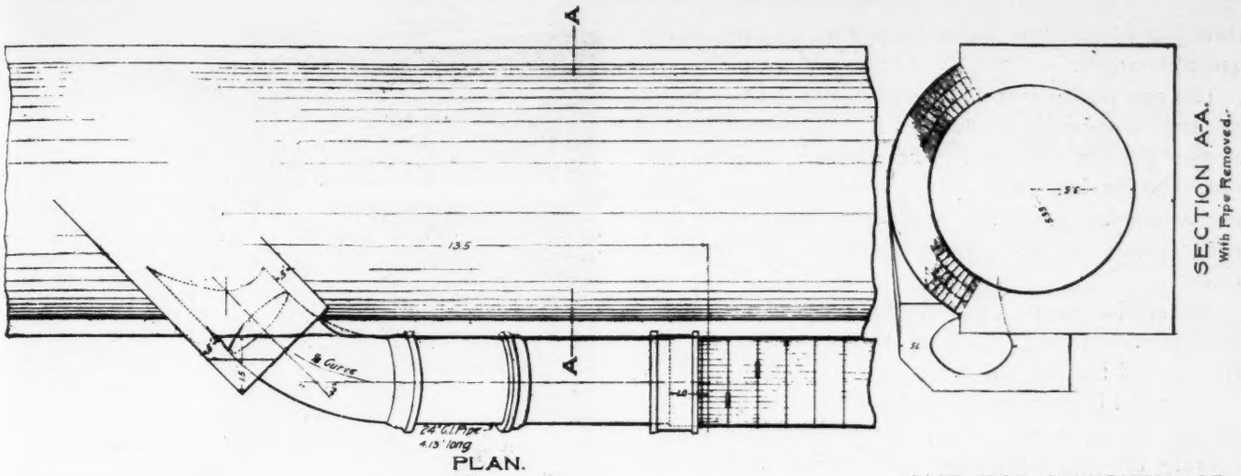
SALT LAKE POWER HOUSE IN COURSE OF CONSTRUCTION

The pumps are the Byron-Jackson 12-inch double suction pumps, constructed with a removable hood over the working parts, self-aligning bearings and brass mounted working parts, with a guarantee of a capacity of 4,500 gallons per minute against a static head of 65 feet, and that when operated at maximum capacity they shall not consume to exceed 150 indicated horsepower.

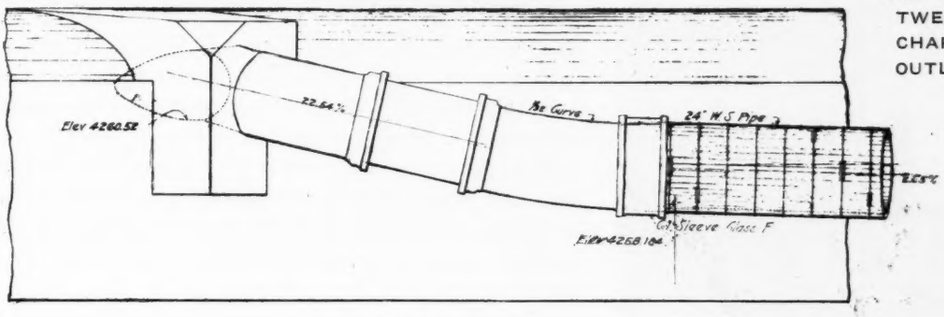
The motor is a Fairbanks-Morse 150-horsepower,



LOCATION OF PUMPING STATION, INTERCEPTING SEWER AND DISCHARGE MAIN



PLAN.



ELEVATION

CAST IRON CONNECTION BETWEEN WOOD STAVE DISCHARGE PIPE AND GRAVITY OUTLET SEWER.

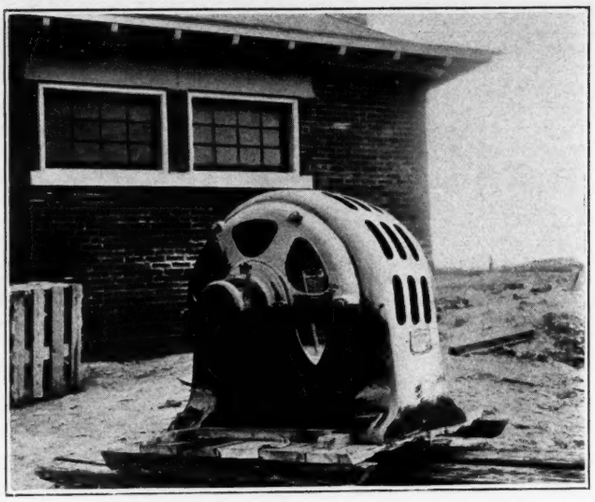
TWENTY-FOUR-INCH WOOD STAVE OUTLET PIPE, SALT LAKE CITY

three-phase, 60-cycle induction motor, operated on a 440-volt circuit.

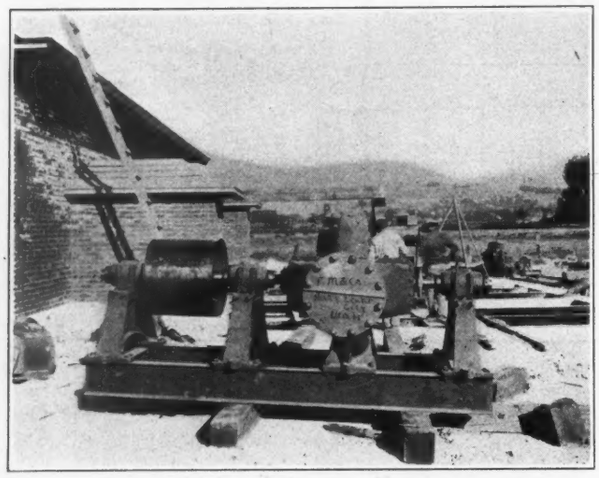
The gas engine is a Fairbanks-Morse multi-cylinder gas engine, specially constructed for the consumption of suction gas producer gas. The engine is directly connected to the line shaft by means of a friction clutch, the arrangement of the machinery being such that either pump can be operated by either gas engine or motor.

The suction gas producer plant consists of a producer, vaporizer, scrubber, receiving tank, purifier, tar extractor and bucket coal elevator.

The plant is guaranteed to produce 100,000 cubic feet of gas per 24 hours and to furnish sufficient gas to operate the 150-horsepower gas engine, with a fuel consumption not to exceed 1¼ pounds of anthracite pea coal per brake-horsepower hour.



150-HORSEPOWER MOTOR, OUTSIDE OF PUMPING STATION

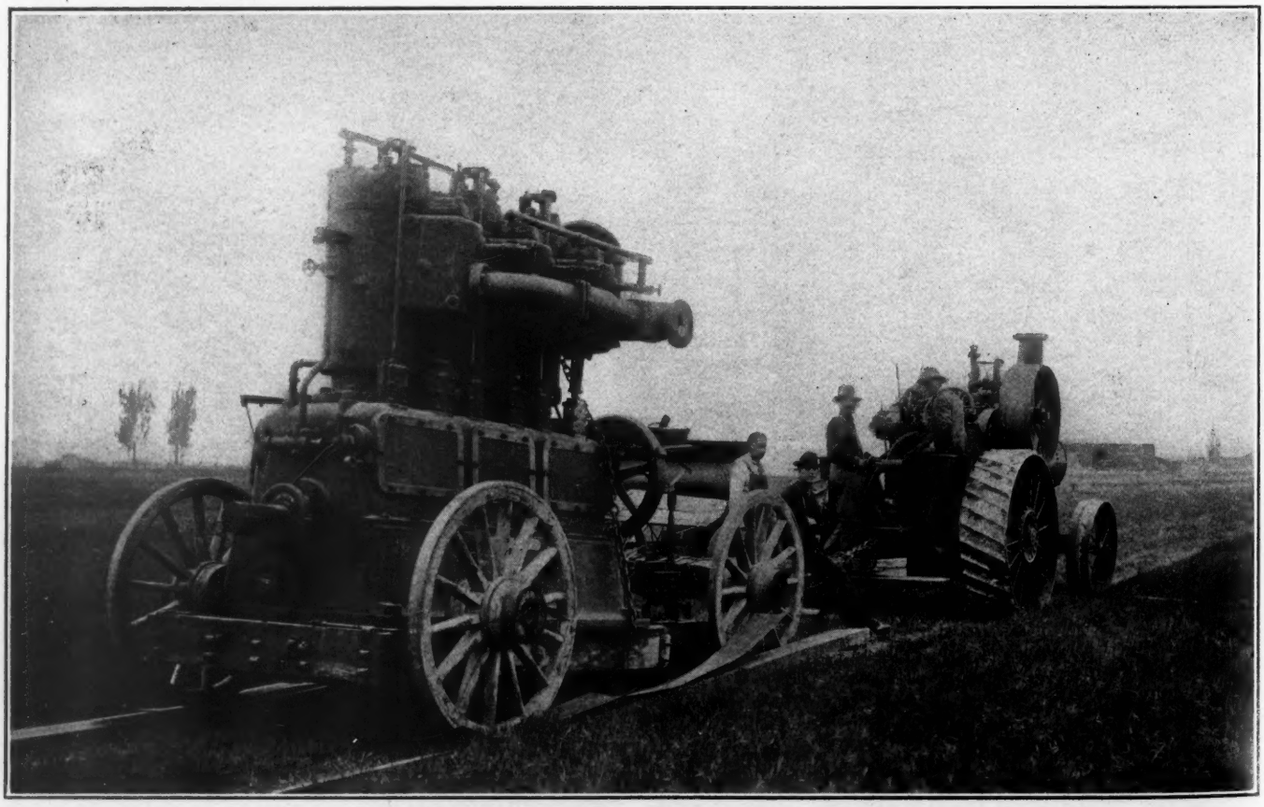


TWELVE-INCH CENTRIFUGAL PUMP

The pumps, motor and engine have been installed, and the pumps have been operated by means of the motor approximately 45 days, 24 hours a day, in draining the sewer to allow the construction of laterals to proceed.

The present flow of the sewer, which consists entirely of ground water, is approximately 4,000 gallons per minute, which one pump operated approximately one-half the time can handle without trouble, this giving a velocity of 5.67 feet per second.

The gas producer plant is now in course of construction, and will probably be in operation early in May.



GAS ENGINE EN ROUTE TO POWER HOUSE

CONCRETE SEWERS AT RICHMOND, IND.

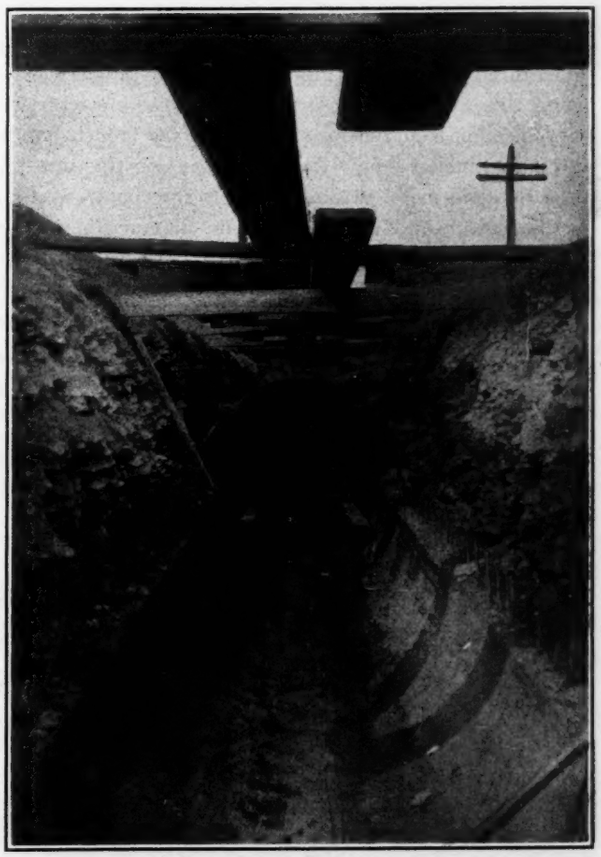
Experience with Reinforced Pipe and Monolithic Reinforced Concrete—Methods of Construction and Detailed Costs of the Same—Monolithic Cheaper for Dry Trenches, Pipe for Wet Ones

By FRED R. CHARLES, City Engineer

WITHIN the past year we have constructed concrete sewers on several different systems, giving excellent opportunity to compare them, both as to advantages of construction and as to probable durability in the future. These systems include monolithic construction, in both circular and horseshoe shapes, using "Blaw" collapsible steel forms, both half-round and full circle, made by the Adjustable Steel Centering Company of Fond du Lac, Wis. For reinforcement we have used twisted steel rods and expanded metal. We have used reinforced concrete pipe made by the Reinforced Concrete Pipe Company of Jackson, Mich., and a larger amount made by the Mercantile Concrete Bridge & Tile Company of Paris, Ill., under the "Sheets system" and patents; also a small amount of non-reinforced concrete pipe. As a result of this varied experience we are convinced, as the Kentuckian said about whisky: "All whisky is good, but some whisky is better." Concrete made of first-class cement and a good aggregate, properly mixed and placed, makes a smooth, substantial sewer, and one which bids fair to last as long as any of the other materials of which sewers are made. Concrete does not come into especial competition with vitrified sewer pipe, but each material supplements the other. For the sizes up to 24-inch the vitrified pipe is doubtless the cheaper, and will be used; above that size the price of vitrified pipe is prohibitive, and concrete furnishes a material suitable in price and quality to encourage the building of these larger sizes.

The first sewer constructed was made of the "Jackson" pipe, 24 inches, 30 inches and 36 inches in diameter. In this system the reinforcement consists of longitudinal rods and circumferential bands. This sewer, although having only two feet of covering in places, stood the weight of an 18-ton street roller passing and repassing in making a macadamized street.

One system, known as "The Northwest Second Street Sewer," was constructed under two contracts—one by Philip Hipskind & Sons and the other by Lewis Hall—at an aggregate cost of $25,000. The excavation was almost entirely in rock, with a maximum depth of 18 feet. The diameter is 48 inches for three-fourths of the length and 42 inches for the remainder. This was all constructed of monolithic reinforced concrete, in place in the trench. A sub-drain of 6-inch common tile was first laid, and this took care of all the water entering the trench, leaving a hard and dry bottom on which to place the concrete, with no danger of having it washed or disturbed by water. On the first half of the work "Blaw" collapsible centers were used, semicircular in shape, and, after forming the invert, these were turned over and used for the arch. In beginning the work, the trench was first shaped to conform to the sewer, leaving six inches for the thickness of the concrete shell. Then, for the flow line, a strip of concrete about 2 feet wide was laid, just as in sidewalk work, between rails which were notched at intervals of six inches to receive the reinforcing rings. At the end of each section of convenient length templates were set, on which straight edges were drawn to give the proper circular shape to the flow line. The reinforcement used at first consisted



MONOLITHIC CONCRETE SEWER
Reinforced with Rods and Rings

MAKING SHEETS REINFORCED CONCRETE PIPE

of ½-inch longitudinal rods and circumferential bands. The latter were in two portions, bent to the required radius, and long enough to give a good lap at the spring line. As mentioned before, the lower rings were held in place by the notches in the side rails while the flow line was being placed. When the flow line was set sufficiently the half-round forms were placed thereon and the concrete deposited. When this was hard enough the forms were turned over, the reinforcing rods and rings put in place and wired together; then the arch concrete was put in and finished over the top with shovel and trowel.

This method of reinforcing, while affording ample strength, proved not quite satisfactory, owing to the difficulty in spacing the metal and holding it in place, it being very tedious work to place and wire together. Consequently, a change was made and expanded metal substituted and found much more easily managed. In using this the rails for forming the flow line were discarded. The concrete was placed on the trench bottom up to two inches below the grade line; on this was laid the expanded metal in sheets bent to the required radius of the sewer and extending some distance above the spring line to allow for lap on the upper portion. Then, at intervals corresponding to the length of the straight edge at hand, were set heavy blocks, cut to the radius of the sewer and set to the proper grade. Using a straight edge between these blocks and the finished surface of the preceding section, the concrete was cut off to the proper grade; then the remainder of the sewer was constructed as before. On the second section of this sewer the form made by the Adjustable Steel Centering Company, of Fond du Lac, Wis., was used. This form is a full circle, allowing all the sewer above the flow line to be constructed at one operation. All concrete was made of Portland cement and good, clean bank gravel, proportioned one to five, made thin so that it would almost run or pour, and then jostled to place, so as to eliminate air spaces and force the cement to the surface of the forms. This method, with proper care, gives a smooth, hard surface. The concrete was mixed as close to the trench as possible, but a short wheelbarrow haul was always necessary.

Below is given a table of average hours of labor per linear foot for building the sewer, using "Blaw" forms and expanded metal reinforcement:

	Labor hours per linear foot
Placing flow line	0.48
Setting invert forms	0.5
Concreting invert	0.44
Setting arch forms	0.33
Concreting arch	0.33
Foreman	0.25

CONCRETE SEWER WITH EXPANDED METAL REINFORCEMENT, RICHMOND, IND.

This concrete was machine mixed. The above includes all the labor, but not the machine.

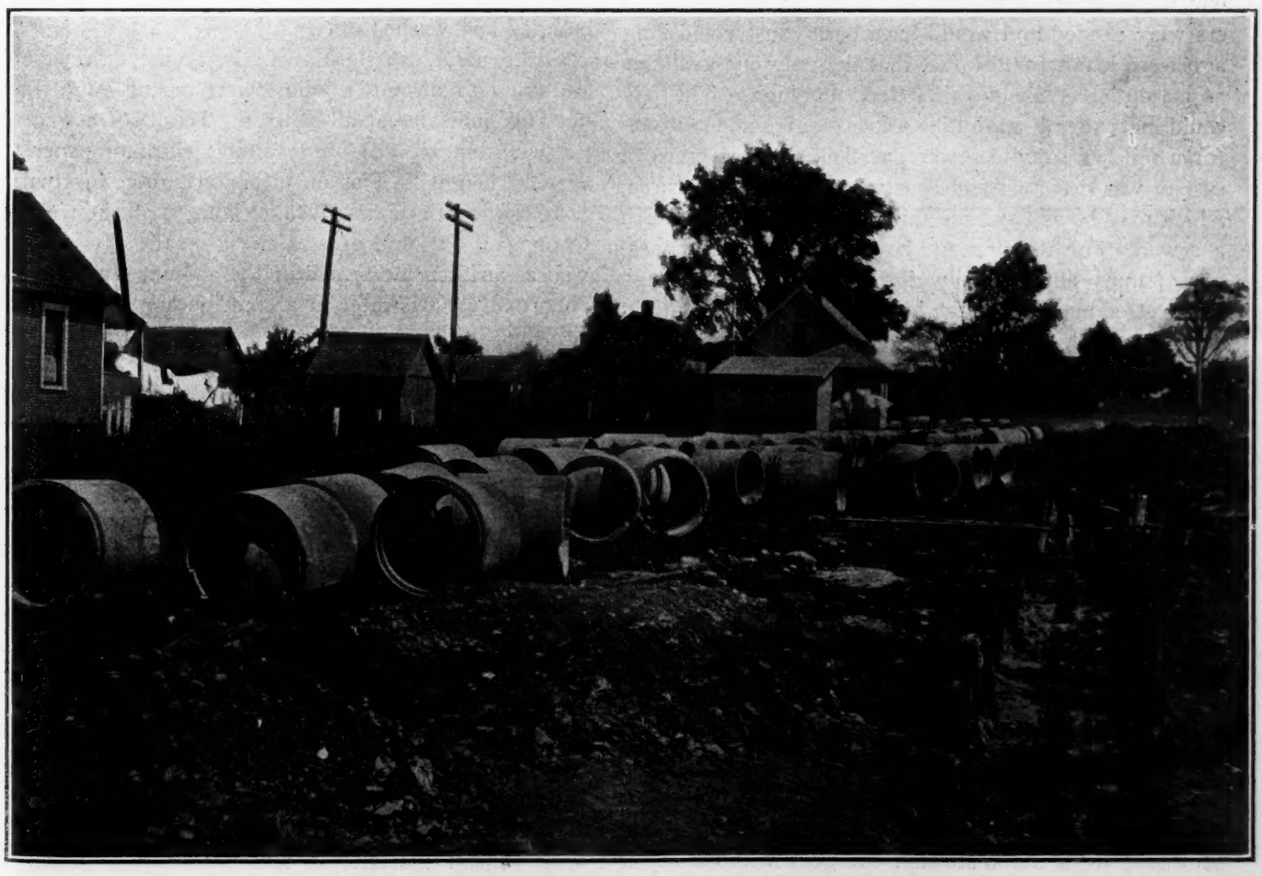
The other sewerage system was about 4½ miles in length, in sizes ranging from 54 inches to 12 inches in diameter. The excavation was largely in rock in depths averaging 9 feet, with a maximum of 13 feet; but the 54-inch was in an open ditch or water course, and consequently was practically above ground. This 54-inch size was built in horseshoe shape, with a flat V-shaped bottom; shell, 7 inches thick, of monolithic concrete, reinforced with expanded metal. In operation the bottom was placed like ordinary sidewalk work, with the sides carried up about 18 inches at the same operation by means of wooden forms, the metal reinforcement being bent to the proper shape and carried up far enough to make a good lap with the top section. For the arch a half-round "Blaw" form was used.

The remainder of the system included 1,330 feet of 42-inch, 1,382 feet of 30-inch and 2,336 feet of 24-inch. For these sizes reinforced concrete pipe, made under the "Sheets" system, was employed. The pipe was made by the Mercantile Bridge and Concrete Tile Company of Paris, Ill., and delivered to the contractor, Philip Hipskind & Sons, along the line of the trench. By this system the pipes are made in forms, consisting of an outside shell and an inner collapsible form, resting on a base plate or pallet. The reinforcement is expanded metal. The end of each pipe is notched or rabbeted for half the thickness of the shell, on the outside of the pipe for half the circumference, and on the inside for half the circumference. In laying, the pipes are so placed that this notch forms a groove at the joints, being on top of the upper half and on the inside of the lower half of the pipe, and by this means the joints are cemented, being always accessible from the last pipe laid, and the mortar being always plastered downward. After being made the pipes were allowed to season at least two weeks before being laid. For handling and placing the pipe in the trench a tripod derrick was used, with a block and tackle or chain hoist, as the pipes are quite heavy, the 42 and 30-inch being made in 3-foot lengths, and the 24-inch in 2½-foot lengths. The average cost of laying these sizes was as follows:

42-inch pipes cost $.083 to lay
30-inch pipes cost .06 to lay
24-inch pipes cost .053 to lay

Our experience showed that for a dry trench with firm banks the monolithic is the cheaper; but if water is encountered, or treacherous soil, or if the backfilling must be done immediately, the pipe is the more advantageous. Also the pipe has the further advantage of being made on the bank, under good conditions, and more easily inspected, so that a more uniform quality is likely to be obtained.

As the discharge of this system is into a small stream, some method of purification was deemed necessary. At the end of the present system an "overflow manhole" was built, so as to permit the storm water to overflow and continue down the present open channel, while the ordinary flow is carried in vitrified pipes about a half mile further down to the disposal plant. Eventually of



REINFORCED CONCRETE PIPE AT RICHMOND, IND.

course the entire flow must be cared for, but at present it seemed advisable to permit the storm water to continue in the present open channel.

The disposal plant consists of a settlement chamber, 10 x 10 feet; a "Bacterial Tank," 20 x 102 feet, built of reinforced concrete, with a roof of wood and felt. From the tank the sewage is distributed by means of "Plural Automatic Alternating Siphons," made by the Pacific Flush Tank Co., onto one of four filter beds, each about 50 x 100 feet in size, consisting of fine gravel three feet thick. The distribution is through vitrified pipe and cypress lumber distributers. The collection is by common farm tile, five rows in each bed, leading into sewer pipe outlets. As the construction was only finished a short time ago, no results of the operation can as yet be given.

SEWAGE PUMPING AT WALTHAM

Sewage from Thirty Acres Lifted Thirty Feet by Automatic Electric Pumps—Operation Has Been Quite Satisfactory—Automatic Gages Useful

By BERTRAM BREWER, City Engineer

In most cities there are low areas which cannot be sewered except at great first cost for long trunk lines either very far below ground or below the level of a parallel, near-by stream. Waltham is no exception to this rule. A low-lying district of about thirty acres, across the river from the well which supplies a large part of the city's water, was built upon to such an extent as to become a menace to the water supply. Sewers were needed and would have been constructed long ago were it not for the fact that the only one available as an outlet is about thirty feet too high. The city could not afford an initial expense of some $60,000 for a mile of gravity sewer paralleling the river, so a system was designed and constructed for the low area, which may be at any time made to discharge into such a sewer. For the present, however, electrically operated pumps automatically force the sewage through 630 feet of main up to the higher level. A water-tight receiving well, 50 feet from the river, of concrete, 19 feet in diameter and 17 deep, was constructed on public land just off the highway. A segment of this well is separated from the rest of the circle by a water-tight reinforced concrete wall to serve as a pump pit. The pumps are located in the bottom of the pit and connected directly with the vertical motors in the little building above. This building, which is entirely above ground, hence subject to all temperatures, is divided into two compartments, one containing hoisting apparatus and the other facilities for access to floats and screen, the other containing the motors and starting device. The plan and section show the details of this arrangement.

This small plant, in proportion to its size, required a considerable amount of specific preparation and it took considerable effort to convince the city goverment that it would work automatically. It goes without saying that city governments, the average citizen and, more especially, the new candidate for mayor have no respect for what I heard a railroad engineer describe as a "tentative proposition" when he was showing a good piece of construction which had later on to be revised in many of its details. The public wants things just right the first time. The preparation, therefore, included an investigation of several automatic installations in New England. The advantages of the compressed air systems, water motors, explosive engines and electric motors were duly considered and observed. In deciding upon electricity the principal problem consisted in securing an automatic, yet reliable and gradual, application of the current to the motor. A controller, designed by the Westinghouse Electric & Manufacturing Company, was selected as being simple in operation and not affected by variable temperatures. The temperature changes, inseparable from an unheated plant above ground, did, however, cause changes in tension and more or less twisting of the control ropes. These difficulties were carefully considered and, after a little experience in operation, entirely overcome.

The pumping plant was put into use in the fall of 1907 and has been operated every day since. The total pumpage for 1908 was 6,608,000 gallons, the amount of power used was 1,810 kw. The cost of pumping, figured on pumping station expenses, was $1.15 per million gallons raised one static foot. The total amount expended for repairs, power and labor was $219.80.

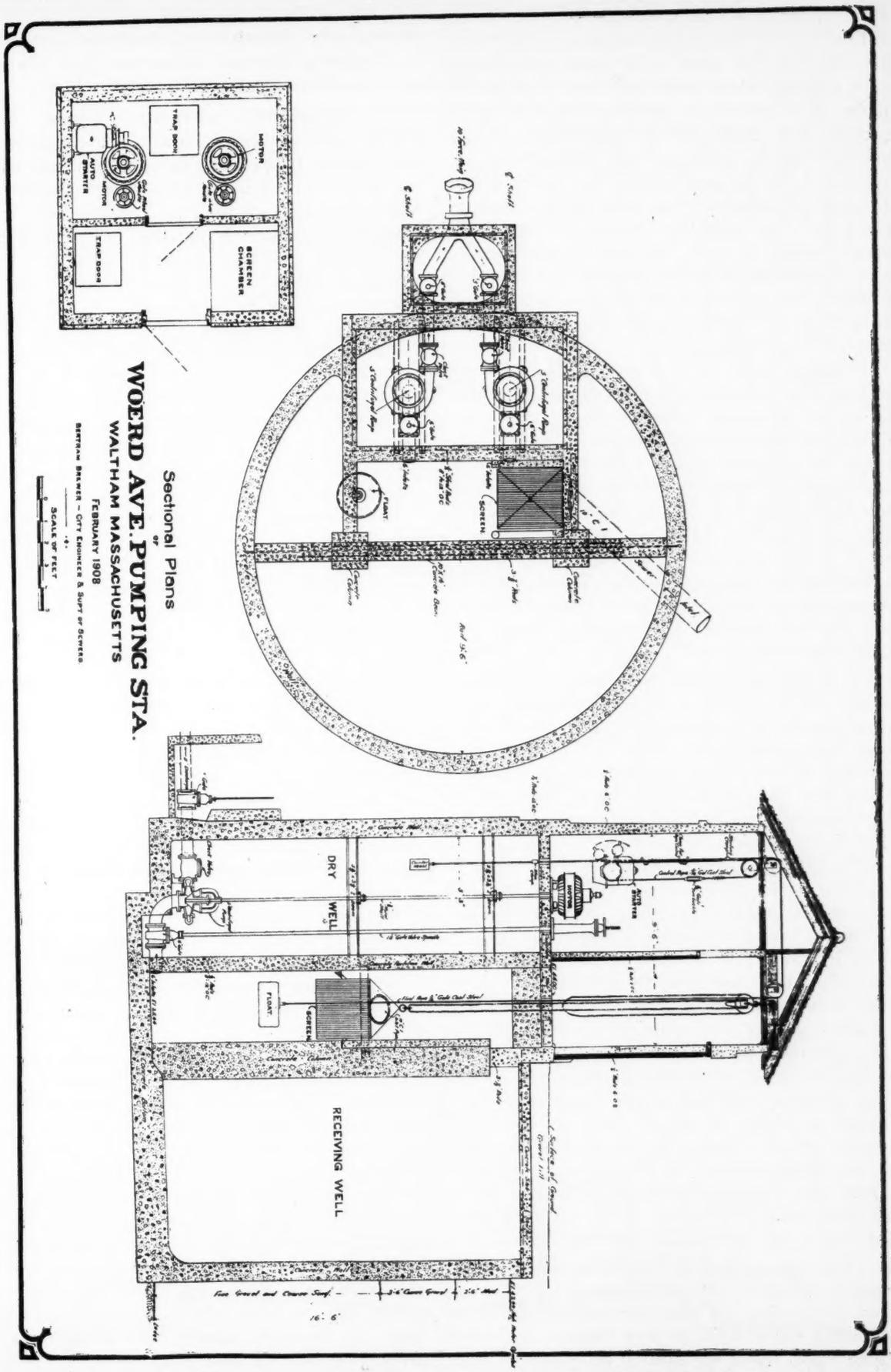
The station is visited by the caretaker three times a week; and once a month, with the assistance of two men, the screen is emptied and the well is thoroughly pumped and washed out.

For general oversight there is, at the office a mile and one-half distant, a Winslow recording gage which not only indicates at all times the height of sewage in the well, but records on a suitable sheet of paper the varying heights. This furnishes accurate information as to the length of time it takes both to fill the well and to pump it out, and gives a check on the power bill as well as an accurate record of the amount pumped. An abnormal use of water in a contributing factory and a stoppage in the main are among the unexpected things which this gage has revealed.

There is in the foreman's house at the sewer yard a similar gage which throws in a bell which rings continuously when the sewage goes above or below the normal in the well. These gages, together with the necessary wiring, added about $1,000 to the cost of the plant. While they are sensitive and easily disordered, they are well worth the expenditure.

OLD CEMENT SEWER PIPE

City Engineer W. F. Mann, of Kokomo, Ind., states that there is in that city, still in excellent condition, a sewer composed of pipes made of cement and sand which has been down thirty-three years. These were made without bells, but were "butt jointed," the joint being made by covering the outside of the pipe at joints with cement mortar. It was necessary to break the pipes to remove them.



AUTOMATIC ELECTRIC SEWAGE PUMPING PLANT AT WALTHAM, MASS.

VENTILATION OF SEWERS

THE ventilation of sewers receives but minor attention from most of the sewerage engineers of the United States, but it is one which causes considerable discussion in England, where large sums have been spent in endeavoring to introduce appliances and methods for improving on the older methods of ventilation. As has been stated before by this journal, we believe the explanation of this difference is not due to the greater carelessness of American engineers, but to the greater necessity for the ventilation of English sewers; this necessity arising from the fact that there is hardly a city in England which has the separate system of sewers, the nearest approach to this being a compound system in which the mains are combined sewers and the laterals are small house sewers.

It is desirable, however, that even the best of American sewers be provided with some method of ventilation, if only to permit the entering and exit of air caused by the fluctuations of volumes of sewage in the sewers. The old idea was to seal the sewer up at all points except the outlet, the earlier plumbing requirements of all cities requiring the use of main traps on house connections or soil pipes. Later, openings in manhole covers came into common use, and we believe the best sewerage authorities to-day advocate the omission of the house trap and the passing of the sewer air direct from the sewer through the house stack to the air above the roof.

Of 31 New England cities reporting recently, 27 report the use of manhole covers for ventilation, three the use of soil pipes only, and one the use of both; although it is probable that in this and all other cases where soil pipes are used, the manhole covers are perforated also. In the Middle Atlantic States 23 reported the use of manhole covers only; 2, street inlets and manholes; 3, inlets only, and one, soil pipe only.

In the Southern States 4 report the use of manhole covers only, and 7 the use of soil pipes. In the Ohio Valley 38 report the use of manholes only, one the use of catch basins only, one the use of lamp holes only, 3 the use of catch basins and manholes, 2 the use of lamp holes and manholes, and 9 the use of soil pipes. In the Upper Mississippi-Missouri district, 34 report the use of manhole covers only, 2 the use of inlets only, 10 the use of inlets and manholes, one the use of lamp holes and manholes, and 10 the use of soil pipes. In the Lower Mississippi and Gulf district, 4 report the use of manholes and 3 the use of soil pipes. In the Rocky Mountain district, 6 report the use of manholes only, 4 the use of soil pipes and one the use of manholes and air pipes (the last being 4-inch T's with pipes of the same bore brought to the surface). Of the Pacific Coast cities 4 use manhole covers and 5 soil pipes.

It is seen that, as far as the reports upon which these figures are based indicate, the Southern States lead in the use of soil pipes for sewer ventilation, followed by the Western States; while the New England and Middle Atlantic States report the smallest percentage of cities which have adopted this method of ventilation.

SEWAGE TREATMENT AT BLOOMINGTON

Settling Tank, Combined Dosing Chambers and Contact Beds, Percolating Filters and Sedimentation Basin—Novel Arrangement of Units—Cost of Plant

By GEORGE L. THON, Resident Engineer

THE sewerage system now under construction at Bloomington, Ind., consists of ten and one-half miles of sanitary sewers, and includes a sewage purification plant. Vitrified tile pipes are being used for all sewers, varying from 8 to 24 inches in diameter. The main sewers are designed to be large enough to take care of twenty-two additional miles of sewer, which when constructed will provide sewerage for the entire city. The present population of Bloomington is about 8,000.

The topography of the city is rolling. It occupies the head of a basin drained to the southward by a small creek having its source near the center of the city. For many months each year this stream is practically dry, and as it flows through a well-settled agricultural community, the necessity arose for a most complete purification of the sewage before discharge therein.

The purification plant is located three-quarters of a mile south of the city limits. The purification process is divided into four parts: (1) Settling; (2) reception in combined dosing chambers and contact beds; (3) filtration through percolating filters; (4) sedimentation preparatory to discharge of purified sewage into the creek.

The 24-inch main outlet sewer carries sewage to within one-half mile of the purification plant. From this point onward it is conveyed in a 12-inch cast-iron pressure main to the plant. The topographic conditions were such that it was impossible to carry the sewage directly to the purification plant by a sewer laid to flow-line grade, and still have sufficient fall to operate the plant by gravity. By means of the pressure line there is an available head of 15 feet, which is ample to work the plant by gravity.

The general form of the sewage plant is an octagonal reinforced concrete structure, containing the settling tank and contact beds, all of which are located in the center of a square area forming the percolating filter and sedimentation basin. A plan and section are shown in Fig. 1.

The settling tank is divided into five compartments, a central octagonal compartment, approximately 34 feet in diameter, surrounded by another octagonal wall, enclosing a space about 64 feet in diameter. The space between the two walls is divided into four outer compartments by four radial walls. The sewage is admitted into the settling tank through a 12-inch elbow attached to the end of the pressure line at the center of the inner compartment. Weirs are located in the tops of the walls of the inner and outer compartments. These weirs are baffled by means of five-foot board partitions attached with iron brackets to the concrete walls. Automatic flap valves are located in the bottom of the wall between the inner and outer compartments of the settling tank, which allow the various compartments to act as

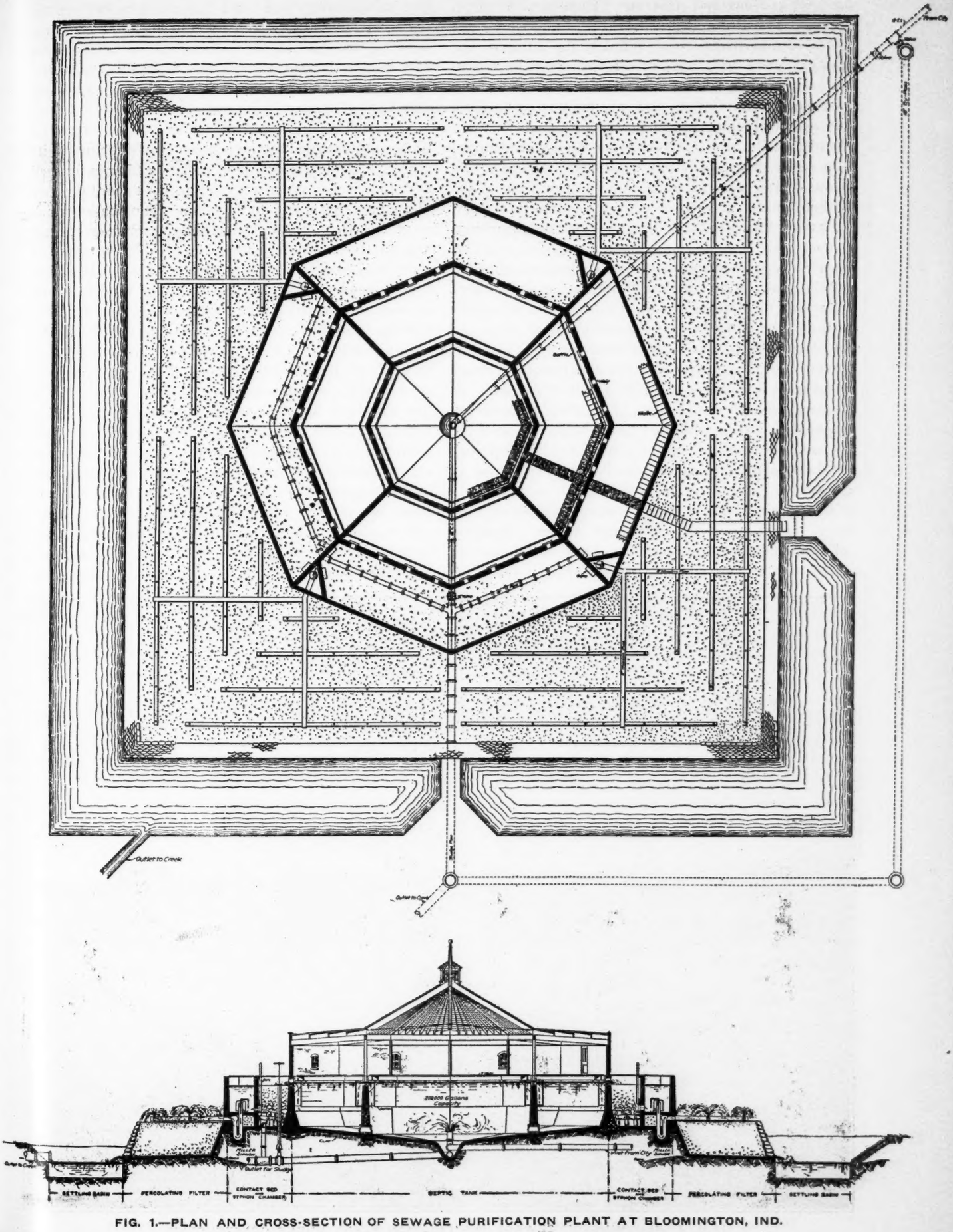


FIG. 1.—PLAN AND CROSS-SECTION OF SEWAGE PURIFICATION PLANT AT BLOOMINGTON, IND.

one unit in filling and emptying. There are, therefore, no stresses on the walls between the compartments, due to one compartment being full and the adjacent one empty. These walls were therefore built of plain concrete without reinforcing. The bottom of the five compartments of the settling tank are built so as to drain into a central sump, located in the center of the inner chamber of the tank. A 12-inch cast-iron pipe equipped with a gate valve leads from this sump to the creek. By means of this pipe the sludge can be flushed out of the settling tank at such times when it becomes necessary.

Arranged around the settling tank are four combined contact beds and dosing chambers. These beds are formed similarly to the four outer compartments of the settling tank, by an octagonal wall 90 feet in diameter encircling the settling tank. The space between this wall and the outer wall of the settling tank is divided into four contact beds by four cross walls. The lower three feet of the contact bed material is formed of rough stone piled in pillars and covered with stone slabs, all laid up in such a way as to provide a maximum amount of voids in this part of the tank. The upper five and one-half feet of the contact bed is filled with crushed stone from one and one-half to three inches in diameter.

In the outer corners of the contact beds, at the four cross walls, are triangular-shaped syphon chambers. These chambers are connected with the contact bed on either side of the cross wall by two 8-inch valves, so that either contact bed can be operated by the syphon chamber between the two beds. An 8-inch Miller automatic syphon, discharging under a head of five and one-half feet, is located in each of the syphon chambers. The syphon is set to draw off the upper five and one-half feet of sewage in the contact bed.

The percolating filter occupies that part of a 132-foot square not occupied by the octagon tank structure in its center. The bottom of the percolating filter is finished with four inches of concrete and pitches toward the face of the filter, draining into the sedimentation basin, which is 15 feet wide and 2 1-2 feet deep, extending entirely around the percolating filter. The filtering material consists of four layers of stone, as follows: A layer one foot in height laid on the bottom of the filter by hand, in such a manner that spaces or openings were left, extending from the rear wall to the face of the filter, these openings being 4 to 8 inches wide, and occurring every 2 feet. On the top of this layer is placed a 2-foot layer of screened stone approximately egg size. Upon this is a 2-foot layer approximately chestnut size, and last a top layer 2 feet in thickness, approximately pea size; making a total thickness of 7 feet of percolating material. The face of the filter is built up of rough stone laid dry, giving the face a batter of ½ to 1, the wall being laid in such a manner as to hold the filter material in place. All stone used in the contact beds and percolating filter is crushed "bastard rock," so-called, found in this locality in connection with the oolitic lime-

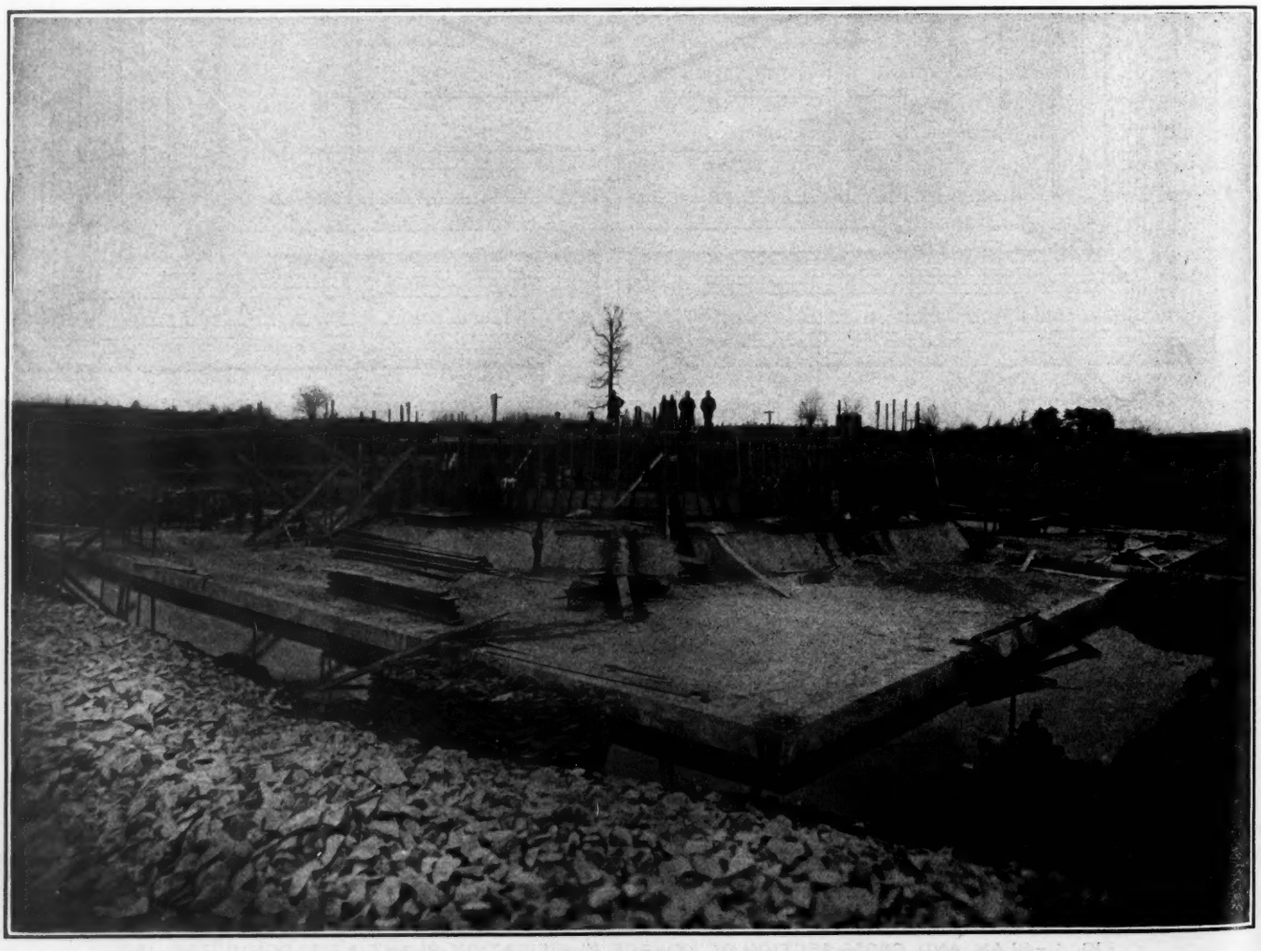


FIG. 2.—BLOOMINGTON SEWAGE PURIFICATION PLANT UNDER CONSTRUCTION

stone. This rock is a very hard limestone with a slight bluish tinge and makes an excellent material for this purpose.

Cast-iron distributing pipes leading over the percolating filter are connected to the discharge end of the syphons. Each syphon discharges its sewage over one quarter of the total filter area by means of these distributing pipes. These consist of two 8-inch cast-iron mains and a series of 6-inch cast-iron laterals. The distribution pipes are supported on 10 x 10-inch oak posts, and are set at an elevation so that the sprinkling nozzles are but 2 inches above the surface of the filter.

There are two hundred nozzles used to spray the sewage over the surface area of the percolating filter. These nozzles are set on 6-foot centers and fifty are connected with the distribution system of each syphon. The nozzles are made of brass and contain an orifice one-half an inch in diameter, and a deflecting cone with an angle of 90 degrees is adjusted so that the apex of the cone is centered one-half an inch above the opening of the orifice. Under the maximum head of 6 feet these nozzles will spray the sewage over an area 13 feet in diameter. The amount of sewage falling on the periphery of this area is small, however, compared to the amount falling nearer the nozzle. The nozzles have therefore been set on 6-foot centers so that when they are discharging under the maximum head the areas wetted by each nozzle will overlap the area wetted by the adjoining nozzles. In this way it is expected to get more uniform distribution of the sewage over the filter area.

The concrete work in the tank is built of a mixture of one part cement, two parts sand and four parts stone. The floor of the percolating filter is built of 1:3:6 concrete. The walls and footings of the contact beds are reinforced with 5-8-inch round steel rods. The bottom of the tank is finished with one-half an inch of 1:1 Portland cement plaster. All the walls of the structure are washed with three coats of neat cement wash, applied with a whitewash brush.

The plant is designed to safely provide for the disposal of 500,000 gallons of ordinary town sewage per day, with the following rates in the different stages.

The total capacity of the five compartments of the settling tank is 224,000 gallons, which capacity, with the above rate of flow per day, allows a theoretical rest period of about 11 hours, if all utilized.

The four contact beds, which also act as dosing chambers for the percolating filters, have a total capacity of 90,000 gallons, or at 50 per cent voids a liquid capacity of 45,000 gallons, or 11,000 gallons per bed. At the rated capacity the beds will work at eleven cycles per day. At this high rate it is not expected that they will do more than aid in reducing the suspended matter carried over from the settling tank. The syphons, being set three feet above the bottom of the contact bed, discharge but two-thirds of the entire volume of the contact bed at each dose. The contact material being so arranged that the voids in the lower portion of the bed are large compared with the voids higher in the bed, the syphon in discharging draws the sewage from the bottom of the bed where the frictional resistance is the least. The sewage last entering the contact bed is on top and is therefore not drawn off until the next dose.

The total area of the percolating filter is 9,400 square feet, or about 0.22 of an acre; the filtration rate, therefore, corresponds to 2 1-4 million gallons per acre per day. The sedimentation basin has a capacity of 155,000

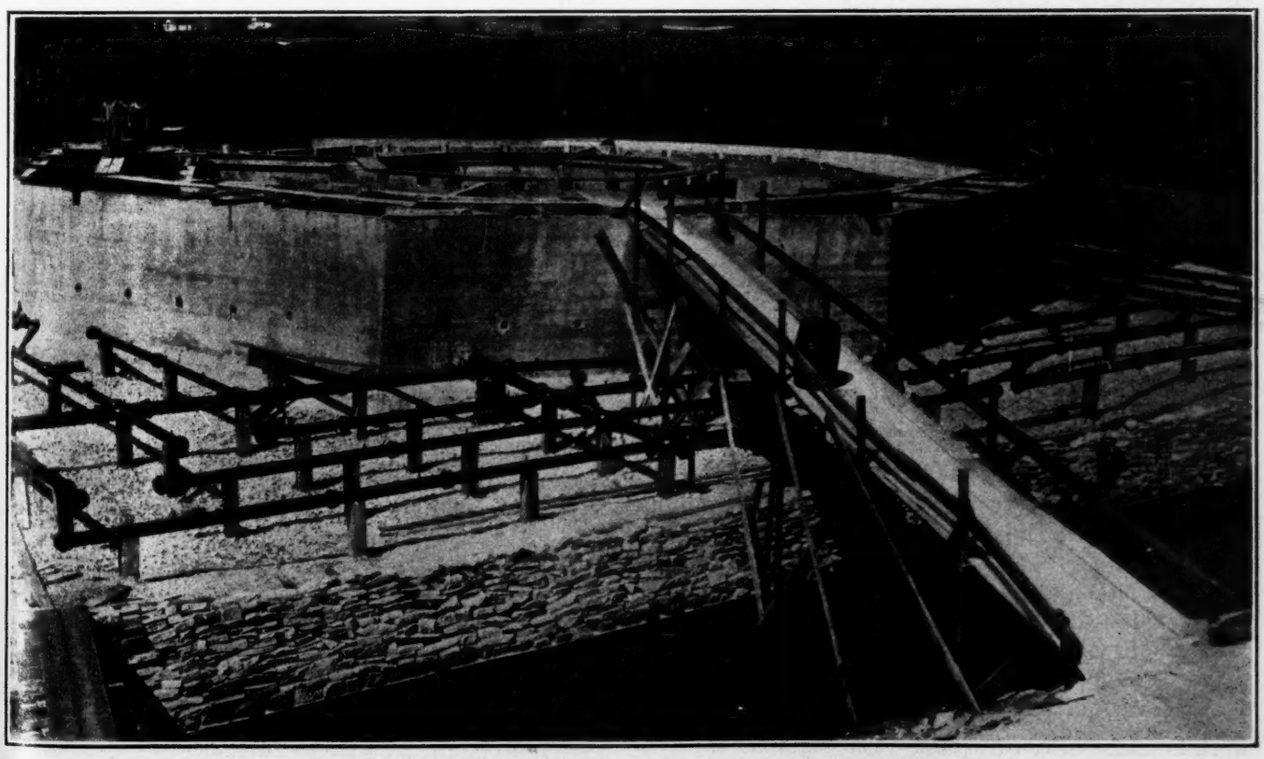


FIG. 3.—BLOOMINGTON PLANT NEARING COMPLETION

Settling Basins in Center, Sprinkling Filter and Distributers in Front and Sedimentation Basin in Foreground

gallons, and this capacity provides theoretically a period of 7½ hours for sedimentation before the effluent is discharged into the creek.

The operation of the plant is as follows: The sewage enters through the pressure main at the center of the inner compartment of the settling tank, flows radially from this tank over the weirs in the surrounding compartment wall, into the four outer compartments of the settling tank. Thence it passes over the weirs in the outer walls of these compartments into the combined contact beds and dosing chambers. The sewage passes equally into the four contact beds, and these, when full to the discharge level, empty onto the percolating filter by means of the syphons and distributing system. The sewage is discharged from the pipes over the percolating filter by the sprinkling nozzles and dripping then down through the percolating filter drains from the concrete bottom into the sedimentation basin, where, after a rest period, the purified effluent overflows into the creek.

Each contact bed and syphon chamber has its separate percolating filter and acts as one separate unit, regardless of the others. They may all discharge at the same time or they may alternate, depending only on the filling of the contact bed. This can be controlled at will by the weirs, however. Each percolating filter will drain and aerate while its corresponding contact bed is filling. By means of the two valves connecting the syphon chamber with the contact bed on either side, two adjacent contact beds can be operated with one syphon chamber and one filter, thus making it possible to cut out one filter area if this be desirable at any time. A contact bed can also be cut out by putting stop boards in the weirs overflowing into the bed, and allowing the other three beds to take care of the entire flow. It may be desirable to operate the plant in this way in order to make repairs on one of the contact beds or filters, or in order to allow them to rest and thoroughly aerate.

The bottom of each dosing chamber may be flushed out at will by flush pipe and valves. All such flushing of the plant is done at high water in the creek. Means are also provided whereby the flow from the creek can be flushed through the entire plant at times of high water if desired.

The contract price of the purification plant was $19,500. The actual cost of some of the principal items in the construction of the plant are as follows, the price paid for day labor being $1.75 per day:

Earth excavation	$0.20	per cu. yd.
Concrete, 1:2:4	8.90	" " "
Concrete, 1:3:6	6.50	" " "
Filter material	1.75	" " "

Work on the plant was started September 1, 1908, by the Independent Construction Company, of Terre Haute, Ind., with W. H. Harris, Manager of the above company, in charge. The plant, together with the rest of the sewer system being constructed under the same contract, will be completed about July 1 of this year.

The plans for the work were drawn by John W. Alvord and Charles B. Burdick, Hydraulic and Sanitary Engineers, of Chicago, who are also superintending the work in course of construction. The engineers are represented on the ground by the writer.

SEPTIC TANK PATENT DECISION

Discussion of Legal Points of the Saratoga Decision, with Special Reference to the Plant at Princeton, N. J.—Oxygen and Sludge Equilibrium Essential

PRINCETON, N. J., is one of the communities which have been notified by the Cameron Septic Tank Company that it considers their sewage disposal plants as infringements of its patents. The borough requested Prof. Chas. McMillan to report upon the matter, which he did a short time ago. The tank used by Princeton has been cleaned out at short intervals, and oxygen has been found in the effluent; for which reasons, as explained in the report, Professor McMillan does not consider this an infringement of the patent as interpreted by the Court.

This discussion of the decision of the Court in the Saratoga Springs case was written by a civil engineer who has made a special study of sewage disposal, and who has also served as an expert in patent law cases. It seems to us to set forth with admirable completeness and clearness one view of this decision, and for this reason is presented in full, except for the applications to local conditions, the report being as follows:

The Court which decided the case in favor of the Cameron Septic Tank Company sustained the process claims of the patent, but concurred with the lower court in denying the apparatus claims, in a ruling which is preceded by a very full and painstaking exposition of the reasons for its decision. This ruling was subsequently made final by the United States Supreme Court in denying Saratoga's petition for a writ of certiorari. Therefore Patent 634,423 *now exists only as construed by the court.*

Patent No. 634,423 covers the combination of three successive processes in the order named, viz., the Cameron Septic process; the aeration of the effluent therefrom; and the purification of the aerated liquid upon aerobic filter beds. The foundation of this combination is Cameron's septic tank wherein his septic process takes place, and without which his claims lose their significance. Moreover, it appears that the allegation of the Cameron Septic Tank Company that the Borough of Princeton is infringing its patent is based upon your passing the sewage of the northeasterly district of the Borough through what the Council designed to be a *settling tank* as a preliminary to purifying it upon filter beds. It seems to me, therefore, that in considering the allegation of the Cameron Septic Tank Company, we need concern ourselves only with the question as to whether or not your settling tank is a Cameron septic tank *as construed by the Court.*

The Court, in construing the patent, first defines *anaerobes* and *aerobes,* and follows these definitions with two others, viz.:

Septic action is the action of a colony of anaerobes preventing the accumulation of solids, unhampered by the presence of aerobes or oxygen or agitation.

The *septic* tank is the home and workshop of such anærobic colony, and its structural characteristic as distinguished from

other tanks includes the roof of septic scum which is built by the aerobes over the sewage current and remains as a permanent part of the tank.

The Court then proceeds as follows:

The essential features of Cameron's process are these. He secures separate and successive action of anaerobes and aerobes on the organic matter of the solids in the flowing current of sewage. He first sets the anaerobes to work under such conditions that whatever aerobes were present in the flowing current as it enters the aerobes' workshop are quickly destroyed, because without air or oxygen they cannot live and at the outflow end of his septic tank there is absolutely none; tests mark free oxygen as zero. He cultivates this colony of anærobes under conditions most favorable for their growth and activity, eliminating light, air and agitation while the slowly moving current is exposed to their activities. There is some oxygen present when the sewage flows in, although it has all disappeared before it flows out; and the current is not completely at rest, it flows in a quiet manner—were it stagnant the desired bacterial action would be disturbed and retarded. But there is a substantial absence from the current of oxygen and agitation. A curious result of setting the anærobes to work under such conditions, after the septic scum has formed, is pointed out in the specifications. "The micro-organisms increase at a fabulous rate, being fed by the incoming solid matter of the sewage until a mass of bacteria is developed sufficient to liquefy substantially all the solid organic matter contained in the sewage passing through the pool * * * and the outflow is in the form of a liquid without solid particles of sewage."

The last point, namely, the curious result revealed by the above quotation from the specifications, is later in the opinion reduced by the Court, by the aid of testimony of both complainant and defendant, to the conclusion that in the course of time a condition of *equilibrium* is reached between the accumulation of organic solids within the tank and their disappearance through liquefaction, so that accumulation of solids practically ceases.

In studying the above quotations, it must be borne in mind that they emanate from a body of learned jurists, trained in logic, in the interpretation of evidence and in the art of exact expression, and that therefore a strict interpretation of their phraseology is the surest way of attaining their exact meaning. With this preliminary, I desire to note that the Court's definition of *septic* action is unique and specific. Apparently, according to the Court, septic action is not merely *some* anærobic action resulting in the disappearance of a part of the organic solids, but a completeness of anaerobic action which results in the disappearance of substantially *all* the organic solids at a rate which prevents their accumulation within the tank.

The Court evidently regards this point as very important. In the closing words of its description, already quoted, of the essential features of Cameron's process, it quotes from the specifications to the effect that substantially all the solid organic matter contained in the sewage passing through the pool is liquefied. In further commenting upon this particular feature of the Cameron process, it says:

This action (the transformation of the sewage solids and the wastes of bacterial energy into a liquid effluent: C. McM.) is thus described by one of defendant's experts: "In my opinion from six to eight weeks is required in which the liquefying action will be established to the extent of creating an *equilibrium* beyond which the solids will not accumulate on the bottom of the tank or on the top thereof." * * *

The Court then adds:

Moreover, as the patentee states, "by this invention crude sewage can be treated for long periods without practically any sludge at all forming in the tank."

Referring to the plant at Saratoga, as to which infringement of the Cameron process claims was not denied in defendant's brief, and in which plant the tanks had not been emptied since they were put in service July, 1903, a period of 2½ years, and no solid matter had been taken from them, the Court adds:

In consequence this equilibrium between the solids and the solid-destroyers, when once established, need not be disturbed—it will continue indefinitely.

Adverting to the utility of the Cameron process, the Court makes this declaration:

That the process possesses utility is beyond dispute; it eliminates the problem of removing "sludge," the solid matter which accumulates in the bottom of some sewage tanks and the disposition of which is often troublesome.

And while correcting the lower court's interpretation of a diagram which had been made quite prominent in the trial, the Appellate Court goes much further, and establishes approximately the proportionate depth which the combined sludge and scum attain in a Cameron septic tank at the time that the condition of equilibrium between solids and solid-destroyers is reached, thus:

It (the diagram alluded to) displays shaded portions at top and bottom of the contents of the tank, representing the surface scum and the deposit. Such shaded portions occupy more than one-half of the entire depth and are of about equal thickness at top and bottom. This is wrong, because the evidence shows that the total solids, when the condition of equilibrium is established, vary between 20% and 25% of the total depth, and the scum is only a few inches in thickness—the total depth being about 8 feet.

Other quotations to a similar effect might be adduced; but the most convincing proof that the Appellate Court regarded a completeness in the liquefaction of organic solids which would in time practically prevent their accumulation within the tank as a distinctive characteristic—a criterion—of the Cameron septic process is furnished by the fact that the Court itself employed this criterion for discriminating between the Cameron septic tank and other sewage tanks operating more or less with anaerobic action, which had been cited in the trial as anticipations of the Cameron patent.

The Appellate Court, in its opinion, also brings clearly into light a second criterion whereby the Cameron septic process and septic tank can be distinguished from all other processes and tanks which operate with more or less putrefaction, namely, *that the effluent from a Cameron septic process cannot contain so-called dissolved oxygen;* and the Court employs this criterion also in determining whether or not the tanks cited in the trial as anticipations are Cameron septic tanks.

Finally, in the Appellate Court's preliminary definition of the *septic* tank, quoted on a preceding page, it says, "its structural characteristic as distinguished from other tanks includes the roof of septic scum which is built by the anaerobes over the sewage current and remains as a permanent part of the tank." Evidently, then, in the opinion of the Court, the formation of septic scum *which*

remains as a permanent part of the tank is still another criterion of the Cameron septic tank. I find no direct evidence in the opinion that the Court applied this criterion to the tanks cited as anticipation; but I think it may be inferred that inasmuch as the accumulated solids were removed from those tanks after comparatively short intervals of time, *the scum formation could not have remained as permanent parts of those tanks.*

PUMPING OF SEWAGE

Brief Statements of Methods and Mechanism Employed in More Than Thirty Cities—Both Centrifugal and Displacement Pumps Used

PUMPING of sewage is required for small sections of a number of cities because these lie lower than any outlet or intercepting gravity sewer which it is possible to construct; and in some cases the sewage of the entire city must be pumped whenever the river into which it discharges is in flood. Also in an increasing number of cases the necessity for treating the sewage requires pumping to elevate it into tanks or onto filtration areas. Several such instances are described in this issue, and it may be interesting to give a list (although this is confessedly incomplete), of other sewage pumping plants throughout the country. The following running description is compiled from reports sent in to this office during the past few weeks.

In Beverly, Mass., a small part of the sewage is raised by electric pumps, and the same is true of Waltham and Lynn. Concord, Mass., pumps a part of its sewage by means of a horizontal, direct-acting, compound, condensing duplex steam pump, having a capacity of 1 1-4 million gallons per 24 hours; an auxiliary pump being supplied for emergencies which is a vertical, cross-compound, simplex engine of one million gallons capacity. Woonsocket, R. I., pumps a part of its sewage; as does Providence, which uses three triple-expansion vertical, fly-wheel engines for this purpose.

In New York State, Buffalo uses three centrifugal pumps; Olean has recently installed a pumping plant at the disposal plant, consisting of centrifugal pumps which are intended to be operated by motors placed directly on the vertical pump shaft, the pumping to be automatic in its operation; but at present the pump is driven by belt transmission. PennYan pumps a part of its sewage. Rochester finds that pumping will be necessary in one section of the city, and expects to use centrifugal pumps for this purpose.

In New Jersey, Newark, Plainfield and Summit are among those pumping sewage. In Newark about 3,000 acres of the southern section of the city is drained by an intercepting sewer taking house sewage with a small amount of storm water. This sewage is pumped by a plant consisting of two double-plunger pumps made by the Watts-Campbell Company of that city which have a maximum capacity of 30 million gallons per day, against a lift of 16 feet. The average quantity pumped per day at present is about 13 million gallons. The city is also constructing a small pumping station, with a capacity of about 500,000 gallons per day, in the western section of the city, which is to be operated by compressed air.

The Plainfield, N. J., pumping outfit consists of two 10 x 6 Ingersoll-Rand Class E, air compressors; two 7½-horsepower Wagner motors, equipped with Cutler-Hammer automatic stopping and starting device with a float switch which operates to start and stop the compressor according to the level of the sewage in the stand pipe; one Fairbanks gasoline engine for operating the compressor in case of failure of the electric current; a 42-inch by 8-inch air receiver, and two Duplex displacement pumps or ejectors constructed by the Latta & Martin Pump Company, of Hickory, N. C., operated by air supplied by the air compressors to the air receiver. One-half of the plant is operated at a time, and when so used it has a capacity of 477 gallons per minute. The pumps are placed in a concrete well 13 feet in diameter; the cylinders composing the pumps being entirely below the level of the sewer, and the air being shifted from one pump to another by means of buckets within the cylinders operating by the difference in weight of the bucket in the empty cylinder and that in the full one, these buckets operating a sort of walking beam which, in turn, operates the valve cylinders. Pipes and valves are provided for blowing the sewage from either pair of cylinders back into the sewer when it is desired to open the cylinders for examination or repair. The sewage is pumped through a force main 2,500 feet long, against a static head of 15 feet and a dynamic head of about 20 feet. The plant is visited twice a day and operates automatically without attention during the remainder of the time.

In Summit, one slope of the town drains toward the Passaic valley, and the sewage from this is raised a total height of 215 feet by means of two compound, triple-expansion, direct-acting pumps, each of a capacity of 1½ million gallons per 24 hours. In Washington, D. C., all the sewage is pumped; and in Baltimore all of that below elevation 60 is pumped, this requiring an installation of five 27½ million gallon pumps which lift the sewage 72 feet. In Norfolk, steam and electricity are used for pumping sewage. In Portsmouth, Va., Shone ejectors are used. Charleston, S. C., uses electrically-driven centrifugal pumps, and Brunswick, Ga., pumps all the house sewage by means of two 8-inch centrifugal pumps.

In Ohio, Columbus has a large pumping plant, some details of which are given elsewhere in this issue. Dayton, Ohio, pumps a part of her sewage, and St. Marys, Ohio, uses two centrifugal pumps for this purpose. Shelbyville, Ind., will use two vertical turbine pumps which, together with the sewer system, will probably be installed this year. Part of Chicago's sewage will be pumped into the Drainage Canal, four reciprocating engines and centrifugal pumps being used for this purpose. East St. Louis, Ill., uses three small centrifugal pumps during high stages of the river. Manhattan,

Kan., and Sioux City, Ia., also find it necessary to pump during high water.

Kalamazoo, Mich., has prepared plans for a sewage pumping station for one section of the city, but so far the financial arrangements for constructing it have not been completed. At Winona, Minn., the Shone ejector system is used. Aberdeen, S. D., uses centrifugal pumps, driven by a 55-horsepower gasoline engine. Houston, Tex., pumps its sewage through 4½ miles of 30-inch cast-iron force main to a purification plant.

Owing to the flat country and great range of the Mississippi River near its mouth, most of the cities in that section are compelled to pump whenever the river is high; among these being Greenville and Vicksburg, Miss. In Salt Lake City, Utah, two 12-inch centrifugal pumps are used for raising the sewage of a section of the city. At Albuquerque, N. M., electric and hydraulic pumps will be used in the proposed system. At Santa Cruz, Cal., one-half of the sewage is pumped by steam pumps. In Stockton, Cal., all the sewage is pumped into a river two miles away.

LAKE FOREST SEWAGE DISPOSAL

Septic Tank, Dosing Chamber and Ten Filter Beds—Plant Allowed to Deteriorate—Official Analyses Showing Degree of Purification

THE proper designing of a modern sewage disposal plant requires expert intelligence, which should be applied to it in every case, but the success of a plant depends largely upon its operation. Unfortunately, many plants are not really operated, but are left to take care of themselves or at most are given but slight attention. To illustrate this it may be of interest to consider the sewage disposal plant at Lake Forest, Ill., which is one of the older American plants which was designed and put into operation in 1902 by Mr. John W. Alvord, Consulting Sanitary Engineer of Chicago.

A study of conditions showed that the population of Lake Forest was very fluctuating, being considerably greater in summer than in winter. The sewage was supposed to be entirely domestic, but it developed that there was considerable storm water which entered by way of connections with eave-troughs. No manufacturing sewage was present.

Owing to the changing population and other matters, the elastic type of septic tank originally devised by Mr. Alvord was adopted. This consisted of two large tanks and three smaller ones of unequal size. The combined tank capacity is about 50,000 gallons. A grit chamber is provided for removing any gravel or similar matter that may be present. Connected directly to the septic tank is a dosing chamber of about 7,000 gallons capacity. In this dosing chamber are ten Pacific Flush Tank Company's flush tanks for discharging the sewage onto ten filter beds. These tanks operate automatically in succession. The septic tank is covered with a light frame structure which is neither light-proof nor air-tight, but which tends to keep the temperature even.

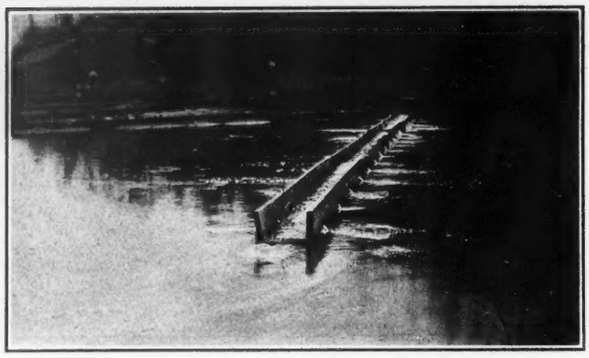
SEPTIC TANK AND PART OF FILTER BEDS, LAKE FOREST, ILL.
Shows bad conditon of banks

The septic tank and filter beds are located at the foot of a bluff on the shore of Lake Michigan. Advantage was taken of this fact to construct the beds of the natural sand of the beach. This sand is quite fine, 85 per cent passing a 40-mesh sieve, and 42 per cent passing a 60-mesh sieve. The beds have an area of 3,200 square feet each. They were constructed by making, between adjacent beds, banks of sand about 14 inches high, held in place by planks. Sewage is conducted to each bed through a separate pipe leading from the dosing chamber, and is distributed by wooden troughs with numerous openings. Numerous lateral underdrains carry the effluent to main carriers which discharge into the lake. The whole plant was designed for a capacity of about 250,000 gallons per day.

In practical operation it has been found that unless the septic tank was working at a maximum of efficiency, finely divided suspended matter coming over from the tank would in the course of time seal the surface of the filters and render it necessary to hand-harrow them after the application of five or six doses. As each bed receives about two doses per day, this meant that the total area would have to be raked over twice a week, and this was recommended by the engineers.

A recent inspection of this plant by our representative showed the following condition. A high tight board fence had been built around the entire plant to protect it from the wind-blown sands of the beach. Outside the fence no odor was noticeable. In the tank house there was some odor which was not seriously offensive. The effluent from the tank to the dosing chamber was quite clear. No definite figure as to the amount of sewage handled was obtainable, but it was estimated to be between 300,000 and 350,000 gallons per day.

The surface of the beds was quite uneven. The banks between the beds were badly broken down, and in some cases the sewage was leaking from one bed to the next. In some cases beds received a dose before the preceding one had entirely disappeared. There was some odor noticeable at the beds, especially immediately after the sewage was turned onto them. The attendant stated that he raked about one bed a day, which gives each bed a raking once every ten days, while the engineers recommended twice a week. He also stated that the plant had been outgrown and needed enlarging badly,



TROUGH DISCHARGING SEWAGE ONTO FILTER BED

and that trouble was experienced with the beds in the winter time, especially in very cold weather, if the surface became covered with a film of ice. No provision is made for supporting this ice above the surface, as by furrowing.

Accompanying is the report of Dr. Arthur Lederer, Chemist and Bacteriologist of the Chicago Sanitary District, who recently made an examination of the plant.

Report of Dr. Arthur Lederer

Samples for the Sanitary District's laboratory were taken December 11, 14 and 15, 1908. A sample of the sand filter effluent was taken but once; the main purpose of this investigation was to determine the efficiency of the tank and the examination of a subsequent effluent from the sand filter cannot give any information on this point; it merely expresses the efficiency of the sand-filter.

The analyses read as follows:

AVERAGES OF THE SEVEN ANALYSES, IN PARTS PER MILLION

	MIXING BOX	TANK EFFLUENT	PERCENTAGE IMPROVEMENT	SAND FILTER EFFLUENT	PERCENTAGE IMPROVEMENT
Residue on evaporat.:					
Total	1403.0	416.0	70.4	300.0	78.7
Dissolved	349.0	331.0	5.2	....	...
Suspended	1053.0	85.0	91.9	....	...
Chlorine	34.0	32.0	...	50.0	...
Oxygen consumed:					
By total	162.7	32.6	80.0	8.2	94.9
By dissolved	32.8	19.6	40.3	Nitrogen as Nitrates, 6.79	...
By suspended	129.8	13.1	89.9	Nitrogen as Nitrites, 0.08	...
Nitrogen as free ammonia	24.9	17.6	...	....	...
Nitrogen as albuminoid ammonia:					
Total	27.7	7.2	74.1	0.8	97.1
Dissolved	7.1	4.6	35.5	....	...
Suspended	20.5	2.6	87.4	....	...
Putrescibility	Putresc.	Putresc.	...	Non-Putresc.	...
Fermentation	Active	Active	...	Active	...
Indol test	...	...	...	Positive	...
Colon bacilli	...	...	...	Present	...
Number of bacteria	1,840,000	618,000	66.4	145,600	92.1

ANALYSIS DECEMBER 11, 1908

MIXING BOX	TANK EFFLUENT
Physical characteristics: Turbidity, much; sediment, much; odor, very strong, gaseous; color, gray, brown.	Turbidity, distinct; sediment, considerable; odor, strong, gaseous; color, yellowish, whitish.
Residue on evaporation:	
Total 1480	380 p. p. m.
Dissolved 360	308 do
Suspended 1120	72 do

ANALYSIS DECEMBER 11, 1908—(Cont.)

MIXING BOX	TANK EFFLUENT
Chlorine 25	22
Oxygen Consumed:	
Total 142.8	23.2
By dissolved 28.0	14.2
By suspended 114.8	9.0
Nitrogen as free ammonia 26.0	16.8
Nitrogen as albuminoid ammonia:	
Total 23.0	8.0
Dissolved 7.4	4.6
Suspended 15.6	3.4
Fermentation Active	Active
Putrescibility test Putresc.	Putresc.
Number of bacteria 2,130,000	730,000

ANALYSIS DECEMBER 14, 1908

MIXING BOX	TANK EFFLUENT
Residue on evaporation:	
Total 788	416
Dissolved 364	336
Suspended 424	80
Chlorine 32	24
Oxygen consumed:	
Total 108.8	30.5
By dissolved 37.8	20.8
By suspended 71.0	9.7
Nitrogen as free ammonia 28.0	14.0
Nitrogen as albuminoid ammonia:	
Total 15.0	7.6
Dissolved 8.0	5.6
Suspended 7.0	2.0
Fermentation Active	Active
Putrescibility test Putresc.	Putresc.
Number of bacteria 1,100,000	185,000

ANALYSIS DECEMBER 15, 1908

	MIXING BOX	TANK EFFLUENT	SAND FILTER EFFLUENT
Residue on evaporation:			
Total	1940	452	300
Dissolved	324	349	...
Suspended	1616	103	...
Chlorine	45	45	50
Oxygen consumed:			
By total	236.4	44.2	8.2
By dissolved	32.8	23.7	...
By suspended	203.6	20.5	...
Nitrogen as free ammonia	20.8	22.0	7.0
Nitrogen as albuminoid ammonia:			
Total	45.0	6.0	0.8
Dissolved	6.0	3.6	...
Suspended	39.0	2.4	...
Fermentation	Active	Active	20% gas
Indol test	....	....	Positive
Colon bacilli	....	....	Present
Putrescibility test	Putresc.	Putresc.	Non-Putresc.
Number of bacteria	2,300,000	940,000	145,600

Here, again, we note that the septic tank is doing the work it is expected to do, although the septic tank of La Grange seems to remove about 5 per cent more of organic solids. Of special importance is the fact that 91.9 per cent of the suspended organic matter and 87.4 per cent of the albuminoid ammonia has been gotten rid of in the tank. The improvement is still more noticeable after the effluent has passed the sand filters. The effluent from the sand filters is clear, colorless and nonputrescible, but not sufficiently pure to be used for drinking purposes (large number of bacteria, including colon bacilli). The large amount of nitrogen as nitrites and nitrates demonstrates the strong oxidation having taken place in the filters. The plant is working well, but irregularities in the sand filtration do at times occur and storm waters have proven detrimental.

The plant is doing fairly efficient work, although it is undoubtedly overloaded, but it can be safely assumed that if the directions of the engineers were carefully followed and the plant given better attention much more satisfactory results could be obtained.

MUNICIPAL JOURNAL AND ENGINEER

Published Every Wednesday by Swetland Publishing Company
THIRTY-NINTH STREET BUILDING
231-241 West Thirty-ninth Street, New York

A. PRESCOTT FOLWELL, Editor
J. H. DONNELLY, F. E. PUFFER, Assistant Editors
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Telephone, 2046 Bryant, New York

SUBSCRIPTION RATES

United States and possessions, Mexico, Cuba.....$3.00 per year
All other countries..... 4.00 per year
Entered as second-class matter, January 3, 1906, at the Post Office at New York, N. Y., under the Act of Congress of March 3, 1879.

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MAY 5, 1909

CONTENTS

Sewerage Information in This Number

IN sewage treatment, sewage pumping and the use of cement in sewer construction are perhaps to be found the latest advances in the sewerage field. These are represented in this issue by descriptions, among others, of the Columbus, O., purification plant, the latest large plant yet in service employing the most recent approved methods. The extent of sewage pumping and the appliances used are set forth in several articles. We aimed, in treating of cement and concrete pipes and sewers, to present most of the methods of construction in common use. One kind of reinforced concrete pipe, known as Lock Joint, is unavoidably not so represented, but a description of its use in Wilmington, Del., will appear next week. The tables on pages 788 to 792 contain information on these and other points from several hundred cities which will be studied with interest.

Cement Sewer Pipe

BOTH in the technical press and in inquiries and other correspondence received at this office, considerable interest has been displayed recently in the matter of cement sewer pipe, especially in relation to its durability. Inquiries were addressed by us to a considerable number of cities where such pipe was used, asking the City Engineer to state whether he considered cement pipe to be more satisfactory than vitrified pipe or less so, and whether its cost was greater or less. A synopsis of all the replies received is given herewith.

Bangor, Me., reports having something less than two miles of cement pipe, 8 to 12 inches in diameter, which cost less than vitrified when laid; but vitrified pipe dealers lowered the price, and have obtained the bulk of the trade since then, its manufacture in that city having been discontinued. The cement pipe laid was smoother than the vitrified, and has proved satisfactory; although some cement pipe, which was laid by the city before it had been properly seasoned and against the desire of the manufacturer, crushed but did not disintegrate.

In Worcester, Mass., the cost of cement pipe is practically the same as that of vitrified clay. In Chillicothe, O., about one-half mile of 24 to 30-inch pipe has been laid at a cost slightly greater than vitrified clay, which has proved to be equally satisfactory. In Superior, Wis., more than a mile of 15 to 20-inch cement pipe was laid at a cost about the same as clay pipe, and has proved equally satisfactory. In Portland, Ore., about five miles of 9 to 12-inch cement pipe was laid about twenty years ago, the cost of which was not recorded, and has proved perfectly satisfactory. In Bellingham, Wash., cement pipe has been laid at a less cost than vitrified clay pipe, and has proved equally satisfactory. In Wabash, Ind., cement pipe costs less than vitrified when the diameter exceeds 15 inches, and is more satisfactory for such sizes. In Paris, Ill., the same is reported, but the limit of diameter is set at 24 inches.

City Engineer Charles A. French, of Laconia, N. H., writes that they laid a section of 15-inch salt-glazed pipe in a sandy soil with a covering of about 4 feet. For sixteen years no trouble was experienced, but last April,

after the frost had gone out of the ground, it was discovered that the pipe had failed by cracking along the sides. The cause is not known, but was attributed to frost, surface-water sewers laid near the surface having been found to be cracked by this cause. City Engineer Luster, of Elizabeth, N. J., writes that a vitrified clay sewer which had been laid about 30 years failed by crushing, which he attributed to the fact that the pipes were, he believed, made by a local firm from a clay which was not well adapted to the purpose. (These were probably some of the "slip-glazed" pipe, once manufactured, which were not found to be durable.) The soil in the vicinity of all the breaks is very heavy, and the sewer was 12 feet or more below the surface.

The above would seem to favor cement pipe, but the remaining reports were more or less adverse to its use. Pipe laid in Lewiston, Me., and made from Rosendale cement twenty years and more ago, disintegrated, and none has been laid since that time. In Portland, Me., there are a great many cement pipe sewers, generally 12 inches in diameter, but they are reported by City Engineer Bion Bradbury to have proved very unsatisfactory, and are constantly being replaced with vitrified pipe. He reports that "The cement seems to wear away on the invert until it becomes so thin that disintegration takes place and sewage is distributed through the soil. We have not laid any cement pipes in this city for twenty years, and doubtless the improvements in construction make such pipe available for sewers."

City Engineer William A. Grover, of Dover, N. H., reports that his trouble with cement pipe "has been chiefly that it was poorly made by careless, if not dishonest, manufacturers. I think it requires more skill to make good cement pipe than it does vitrified, and defects are not as readily detected. I am unable to give figures on the cost of manufacture, but cement pipe has always sold in this town about 30 per cent below the other. I have had occasion to dig up several cement pipe drains which had been down less than fifteen years, and have found them disintegrated; but this I do not think is typical of cement in general, but only of this cement pipe in particular."

City Engineer William F. Williams, of New Bedford, Mass., writes: "I am unable to give you the reasons which led the city to abandon the use of cement pipe in favor of vitrified clay pipe. No cement pipe has been laid in this city for twenty years. If you were to ask why we do not give cement pipe a trial now, I should say that the principal reason for not making a change is that we are entirely satisfied with vitrified clay pipe. As far as we have had occasion, we relay sewers of this pipe, and have always found them in very satisfactory condition. I might also add that the production of vitrified clay pipe is large and there is never any trouble about getting orders filled. On the other hand, I do not recall a name of a maker of cement pipe, and I do not find in my collection of price lists, which is very large, a single list of cement pipe. But as I have already stated, the chief reason for continuing the use of vitrified clay pipe is that it has not, to our knowledge, failed in any essential detail. It has the necessary strength, it is not eroded by sewage, and our men are used to laying it."

Mr. Charles M. Slocum, City Engineer of Springfield, Mass., writes as follows:

All of the cement pipe that was used in this city from the time we first commenced laying pipe sewers in the late '60's up to the year 1890 was of local manufacture, made by some two or three different concerns who sold their products to the city and other parties as well. The city exercised no particular oversight of the cement pipe laid, and that purchased during the last few years of its use proved to be more or less inferior. Considerable of our difficulty seemed to be due to improper mixing of materials, for some of the cement pipe that has been replaced with vitrified since 1890 was found to be more or less honeycombed and eaten away in spots. It is possible that some of the trouble might have been due to inferior cement or improper use of the same; although I am of the opinion that the quality of the cement itself did not figure to any considerable extent.

We have been constantly taking up the cement pipe sewers since the year 1890 and replacing the same with vitrified pipe, and all new extensions have been made with vitrified pipe also. Some of these cement pipe sewers that we have taken up, that were laid in the earlier part of the period when the cement pipe was used, have been found quite sound and perfect. I do not wish to be understood as entertaining the opinion that cement pipe is necessarily inferior, for there are good reasons, in view of the very large use of cement in nearly all construction work, for the opinion that it is quite possible to manufacture a cement concrete pipe with or without reinforcement that should give superior results.

As we have not purchased or used any cement pipe for nearly twenty years, we are not able to say much on the score of comparative cost as compared with vitrified pipe; but during the first few years of the use of the vitrified pipe, when we were buying for from 65 to 70 per cent discount for standard Eastern list, we found that it was actually cheaper than cement pipe of same size.

In Pawtucket, R. I., about 1,300 feet of 20 x 30 and 24-inch cement pipe has proved less satisfactory than vitrified clay pipe, although none of it has failed. In Hartford, Conn., nearly two miles of 10 to 15-inch cement pipe has been laid by private parties, and is considered less satisfactory by City Engineer Ford, some of it having been found crushed.

In Richmond, Va., Charles E. Boling, City Engineer, states that a small quantity laid many years ago proved unsatisfactory.

In Dayton, O., vitrified pipe is preferred on heavy grades, as cement and concrete is worn by erosion. In Iowa City, Ia., 1,400 feet of 18-inch pipe was laid at a less cost than that of vitrified clay, but has been found to be less satisfactory, although none of it has failed by crushing. In Aberdeen, S. D., 800 feet of 24-inch cement pipe has been laid, some of which failed because not sufficiently cured when delivered on the work.

About the year 1888, when the major part of the sewer system of Helena, Mont., was put in, the engineer in charge reported to the City Council that he could lessen the cost of construction by using cement pipes instead of vitrified ones, even though cement was $7.00 per barrel at the time; as vitrified pipes had to be shipped in from the East at the time, and freights were high. He was authorized to use this construction, hence half of the present laterals are of cement.

In 1904 the sewer inspector reported that some of the cement pipes were commencing to disintegrate on the invert. Charles M. Helmick, then Assistant to the City

Engineer, and now City Engineer, found this to be the case. The pipes seemingly were sound above the invert, or rather the water surface, and Mr. Helmick reports that where he has had occasion to cut into them in several places since, he has uniformly found them sound on top.

The soil there is clayey and gravelly, and stands so well that the trenches rarely have to be braced when constructing sewers, so that none of the sewers have broken down as yet.

Just why these pipes should rot on the invert is not known, but as they are sound above, Mr. Helmick attributes it to the deleterious effects of the raw sewage. This is very dilute with practically no manufacturing waste of any kind, and the flow is approximately 1,500,000 gallons per day, with a population of about 16,000.

He does not think there is any question as to the deleterious effects of sewage on cement pipes; and while they can very likely make cement pipes at the present price of cement ($2.50 per barrel), much more cheaply than they can buy vitrified pipe (8-inch at 22 cents per foot); still, in view of the fact that they have had some trouble with the cement ones, and further, that the vitrified pipes are affected by neither alkalies nor acids and are practically indestructible, it seems to him that good engineering designates the latter, more especially when they can be obtained at a reasonable cost.

In Manistee, Mich., there are 10,690 feet of cement pipe sewers, of which City Engineer Joseph E. Craig has written a brief statement, which is appended.

BRICK AND CEMENT PIPE SEWERS OF MANISTEE

By JOSEPH E. CRAIG, City Engineer

THE City of Manistee, Mich., has 5,750 feet of brick sewers, ranging from 30 to 54 inches in diameter, and 10,690 feet of cement pipe sewers, of elliptical section, ranging from 12 x 19 to 32 x 40 inches. The brick trunk lines were built twenty-two years ago, and are at a depth of from 14 to 29 feet, part of the line being in a very unstable stratum of sand. The fall is from .05 of a foot to 1.5 feet in 100. A very careful investigation, recently made, shows that for some 2,000 feet the sewer has settled as much as 2 feet; this is probably due to the fact that many piles have been driven near the sewer, on both sides, as foundation for heavy evaporation vats of a salt works. In other places the sewer has settled a few inches, but not seriously. It cannot be ascertained whether the settling occurred mostly when the piles were being driven, or was gradual for a long period. Several breaks in water mains have occurred in this vicinity, hence some have the opinion that disturbances in the earth at this point are due to the many millions of gallons of salt water that have been pumped from a depth of 3,000 feet, during the past 15 years. The writer puts no faith in such belief, and has for argument that 12 and 15-inch vitrified pipe sewers on the same street with the broken water mains, but at a depth of 12 feet, remain in good condition and undisturbed. The brick sewer is cracked and broken for almost its entire length. A lead pencil can be stuck in 6 inches between the bricks in many places, and below the flow line of house sewage nearly all the mortar has disappeared from between the bricks to a depth of 2 or 3 inches. The remaining mortar in the joints appears soft and dead. This mortar was made of lime and sand. All of these sewers discharge both storm water and house sewage. In places the mortar is gone to such an extent that the bricks of the arch are touching each other; in other places bricks can be pulled out with the fingers, being altogether free.

Of the 10,690 feet of cement pipe laid, about 1,600 feet have been abandoned and replaced by vitrified pipe. These sewers were laid nineteen years ago, and range in size from 12 x 19 to 32 x 40 inches. The 18 x 24 pipe are about 2½ inches thick and have a flat surface 12 inches wide at the bottom, reducing the thickness to 2 inches at the lower center, and increasing it to 4 inches near the center of the lower quadrants. It is claimed that these pipe were made of Milwaukee natural cement, with about 5 per cent imported Portland, and a good coarse sand containing many pebbles up to ½ inch in diameter. Pipes were made in 3-foot lengths; smaller sizes having common socket ends, and larger ones having ends bevelled so one pipe would slip into the next about 3 inches, leaving the outside surface of sewer a straight line. These cement pipe are laid under varying conditions; on grades ranging from 0.3 to 12 per cent; in clay, sand and loam; and at depths of from 10 to 26 feet. Very recently a 12 x 19-inch line became clogged, it being under 18 to 22 feet of heavy clay. Investigation showed the sewer to be a total wreck. Not one joint of the old sewer was found that could be lifted out of the trench without falling to pieces. The material of the pipe was dead and rotten, so that it could almost be broken up with the bare hands. Some of the pipe made at the same time and in the same way were not used, and have been left on the surface of the ground exposed to the rain and frost for 19 years; these are yet hard and sound, save for a few small cracks. This indicates that being used as conduits for sewage and being buried in the ground has in some way affected the material. Stresses from settling of the fill might break the pipe, but could not change the character of the material. Some of the larger cement pipe sewers are yet in fairly good condition, though all that have been examined are cracked considerably. The city will have to replace 1,200 feet more of the 12 x 19-inch cement sewer with vitrified pipe in a short time.

None of the twenty miles of vitrified pipe sewers has given trouble that could be attributed to the material. These range in size from 9 to 30 inches, and have been in use from one to twenty-two years.

The experience of this city shows that the vitrified pipe which has been used here gives better results than either the cement or brick sewer. However, the failure of the brick sewer was due to the mortar; the bricks now being in perfect condition. It is possible that with a first-class Portland cement mortar and with pipe sewers of similar material, the feeling toward brick and cement pipe sewers might be different here. But of such as were used, vitrified pipe proved a success, while brick and cement pipe developed faults. Also the cost of construction favors vitrified pipe, hence future construction in this city will probably be of that material.

SEWERAGE AND SEWAGE TREATMENT IN THE UNITED STATES

Data Recently Collected, Describing Methods of Sewage Treatment, if any; Methods of Ventilating Sewers; Use of Catch Basins, and Amount and Sizes of Vitrified and Concrete Sewers

CITY	System	Methods of Sewage Treatment, or Disposal	Method of Ventilating Sewers	Are House Connect'ns Trapped	Are There Catch Basins on Street Inlets	Vitrified Pipe	
						Total L'gth, ft.	Diam., Inches
NEW ENGLAND							
BANGOR, ME.	Combined	Discharges into Penobscot river. No treatment contemplated.	Manhole covers	Yes	Yes	Considerable.	8 to 24
GARDINER	Mostly separate; part combined.	Discharges into Kennebec river		Generally.	Yes	22,700	8 to 12
LEWISTON	Combined	Discharges into Androscoggin river		Yes	Yes	54,131	6 to 30
PORTLAND	Combined in old city; separate in new.	Gravity to tide water	Manhole covers	Yes	Yes	167,368	.....
SO. PORTLAND	Combined	No treatment contemplated	Manhole covers	Yes	Yes	25,000	8 to 30
CONCORD, N. H.	Both	No treatment contemplated	Mostly through soil pipe.	Permitted but discouraged.	Yes	145,000	6 to 30
DOVER	Combined	No treatment contemplated	Manhole tops	No.	Gen'lly No.	13,000	6 to 18
KEENE	Separate	Discharges into river. No treatment contemp't'd	Through soil pipe	No.	.....	128,233	6 to 18
LACONIA	Separate	Discharges in Lake Winnisquam. Treatment contemplated.	Through soil pipe	No.	.....	103,937	4 to 15
PORTSMOUTH	Combined	No treatment contemplated	Manhole covers	No.	Yes	Unkn'wn	8 to 18
BARRE, VT.	Separate			Yes	Yes	Unkn'wn	6 to 24
CONCORD, MASS.	Separate	Screening and intermittent filtration. Constructed 1899. Sludge dumped near beds.	Manhole covers	No.	.....	441,260	6 to 12
EVERETT	One system comb'd, four systems sep'te.	Each system empties into Metropolitan trunk sewer.	Manhole covers	Compulsory.	Yes, and traps.	221,730	8 to 24
FITCHBURG	Combined	Discharges into river. No treatment contemp't'd	Manhole covers	Yes	Yes	177,713	8 to 24
GARDINER	Separate	Sedimentation and sand filters. Sludge from sedimentation tanks spread on sludge beds and used for fertilizer.	.....	Yes	.....	131,990	6 to 18
HAVERHILL	Both	Discharges into Merrimac river. No treatment contemplated.	Manhole covers	Yes	Yes	192,499	6 to 24
LAWRENCE	Combined	Discharges into Merrimac river	Manhole covers	Yes	Yes	*246,800	6 to 24
MIDDLEBORO	Combined	No treatment contemplated	.....	Yes	Yes	Unkn'wn	.....
NEW BEDFORD	Mostly comb'd; part separate.	No treatment contemplated	Manhole covers	Yes	Yes	321,440	8 to 36
NEWTON	Separate	Discharges into Metropolitan trunk sewer	Manhole covers and soil pipes.	No.	Yes	493,992	Mostly8
ORANGE	Separate	Discharges into Millers river	.....	Yes	.....	47,000	6 to 15
QUINCY	Separate	Pumped into Metropolitan trunk sewer	Manhole covers	Yes	.....	268,981	8 to 24
SPRINGFIELD	Combined	Discharges into Connecticut river	Manhole covers	Yes	A few only.	319,623	8 to 24
SOUTHBRIDGE	Separate	Sedimentation and sand filters. Constructed 1908. Sludge given to farmers.	Manhole covers	No.	.....	56,070	8 to 20
TAUNTON	Separate	Discharges direct into Taunton river	Manhole covers	Yes	Yes	.....	8 to 24
WEBSTER	Mostly separate	Sand filtration contemplated	Manhole covers	Yes	Yes	26,400	8 to 20
WORCESTER	Both	16 chemical precipitation tanks, 53 acres of sand filters, experimental septic tanks, contact beds and sprinkling filters. Construction begun in 1888. Farmers took 10,000 cu. yds. last year; 15,000 cu. yds. dumped in swamp.	Manhole covers	Yes	Yes	†739,543	6 to 30
BRISTOL, R. I.	Separate	Discharges into ship channel in harbor	Manhole covers	Usually.	.....	60,000	8 to 20
NEWPORT	Combined	Discharged into sea	Manhole covers	Yes	Yes	178,918	6 to 24
PAWTUCKET	Combined	Screening, sedimentation and sand filters. Constructed in 1894. Sludge buried in ground.	Manhole covers	Yes	Yes	241,930	8 to 24
PROVIDENCE	Combined	Chemical precipitation. Completed 1901. Sludge pressed and carried away in scows.	Manhole covers	Yes	Generally.	770,391	8 to 18
WOONSOCKET	Separate	Intermittent filtration. Sludge buried or dumped on low ground.	Manhole covers	Yes	.....	91,221	8 to 24
HARTFORD, CONN.	Combined	Not treated	Manhole covers	Yes	Yes	Unkn'wn	8 to 30
MERIDEN	Separate	Filtration through natural sand beds. Constructed 1892. Sludge used to fertilize city land near beds.	Manhole and flush tank covers.	Yes	.....	‡195,890	6 to 36
NEW BRITAIN	Separate	Screening and intermittent filtration. Constructed 1902. Sludge plowed into soil on city land.	Manhole covers	Yes	Yes	359,568	.....
NORWALK	Combined	Discharges into Long Island Sound	Manhole covers	Yes	Yes	63,400	10 to 24
WALLINGFORD	Combined	Not treated	Manhole covers	Yes	Yes	No rec'rd	.....
MIDDLE ATLANTIC							
ITHACA, N. Y.	Separate	Septic tanks. Constructed 1907	Manhole covers	Yes	.....	153,323	6 to 30
JAMESTOWN	Separate	No treatment contemplated	Manhole covers	In low districts only	.....	260,000	6 to 30
JOHNSTOWN	Combined	No treatment contemplated	Manhole covers	Yes	Yes	95,376	6 to 24
LANCASTER	Separate	Screening, septic tanks and contact beds. Under constrcution.	Manhole covers	Yes	.....	86,000	8 to 30
LITTLE FALLS	Combined	No treatment contemplated	Manhole covers	Yes	Yes	66,000	6 to 24
OGDENSBURG	Combined	Discharges into St. Lawrence river	.....	Yes	Yes	102,000	8 to 24
OLEAN	Mostly combined	Septic tanks and sprinkling filters. Sludge plowed in.	Manhole covers	Not generally.	Yes	136,752	6 to 24
ROCHESTER	Both	Screening and sedimentation contemplated	Manhole covers and surface sewers.	Except on sep. sys'm	No.	All under 24 ins.	.....
TARRYTOWN	Separate	No treatment.	Manhole covers	Yes	.....	.....	8 to 24
TROY	Combined	Discharges into Hudson river	Manhole covers	No.	Yes	120,000	4 to 24
WATERTOWN	Both	No treatment.	Manholes and catch basins.	Very few.	Yes	126,720	8 to 36
BAYONNE, N. J.	Combined	No treatment contemplated	Manhole covers	Yes	Yes	97,900	8 to 24
CARLSTAAT	Separate	Septic tank and sewers to be built this year	.....	.....	.....	.....	.....
EDWARDSVILLE	Separate	Treatment contemplated	Manhole covers	Some	Yes	11,500	8 to 30
ELIZABETH	Combined	No treatment contemplated	Manhole covers	Yes	Yes	296,790	8 to 30
HOBOKEN	Combined	Discharges into Hudson river	Manhole covers	Yes	Yes	No rec'rd	.....
NEWARK	Both	No treatment contemplated	Manhole covers	Yes	Yes	983,162	8 to 30
NORTH PLAINFIELD	Only storm						
PLAINFIELD	Separate	Screening, septic tanks and contact beds. Sludge dried on sand filters and used as fertilizer.	Through soil pipe	No.	Some§	256,753	8 to 24
RUTHERFORD	Separate	Septic tanks	Manhole covers	Yes	.....	132,000	8 to 24
ALLENTOWN, PA.	Storm water	Screening, septic tanks and sprinkling filters adopted. Sludge placed on land to dry.	.....	.....	Yes	.....	.....
ALTOONA	Combined	Sand filters for one district, about ⅛ of the city	Through branches	No.	Yes	320,100	6 to 30
CARLISLE	Private, separate; public storm.	Contact beds voted down last year	.....	.....	Old, yes; new, no.	5,000	18 to 24
CLEARFIELD	Both		Manhole covers and inlets.	No.	5 on hills.	30,000	6 to 24
EASTON	Both	Treatment in immediate future doubtful	Inlets on combined system.	Yes	Less than half.	36,000	8 to 30
HANOVER	Separate	Septic tanks and contact beds	Manhole covers	Yes	.....	52,800	8 to 15
HARRISBURG	Combined	Plans for treatment to be made this year	Manhole covers	Yes	Yes	.....	.....

*An unknown amount of cement pipe, laid in the 70's, included in this total. †Includes both cement and vitrified pipe.
‡Includes brick sewers. §Catch basins being changed to inlets.

CITY	System	Methods of Sewage Treatment, or Disposal	Method of Ventilating Sewers	Are House Connect'ns Trapped	Are There Catch Basins on Street Inlets	Vitrified Pipe	
						Total L'gth, ft.	Diam., Inches
MIDDLE ATLANTIC— Continued							
Hazleton	Combined	No treatment		Yes	Yes	50,800	12 to 24
Homestead	Combined	None	Manhole covers	Yes	Yes	80,000	12 to 24
Middletown	Separate	Treatment probable within a year		Yes	Yes	24,000	10 to 24
Oil City	Old, combined; new, separate	Considering subject of treatment	Combined, by stacks	Yes	On sts. below 5% gr.	126,720	6 to 24
Rankin	Combined	Empties into Monongahela river	Manholes and lamp-holes.	Yes	Yes	43,000	10 to 30
Renovo	Combined	No treatment contemplated	Open inlets	Yes	Yes	Very l'tle	
Scranton	Combined	No treatment contemplated	Manhole covers	Yes	Yes	449,000	6 to 30
Slatington	Combined	Discharges into Trout creek		Yes	Yes	3,849	22 to 30
Stroudsburg	Combined	Treatment contemplated in near future	Manhole covers	No	Yes	10,000	6 to 24
Warren	Both	Treatment contemplated in near future	Manhole covers	Yes	Yes	Some miles.	8 to 36
Wilkes-Barre	Both	Discharges into Susquehanna river		No	Yes	369,600	6 to 24
Williamsport	Separate	Discharges into West Branch of Susquehanna	Manhole covers	Yes	Yes		
Milford, Del	Separate	Irrigation. Sludge deposited in river	Through inlets	No	Yes	4,200	8 to 16
New Castle, Del	Private, separate	System contemplated, to discharge into Delaware river.				500	8
SOUTH ATLANTIC							
Cumberland, Md	Both	None	Outlets and manholes	Yes	Yes	12 miles	6 to 36
Norfolk, Va	Separate	Pumped into tidal streams	Through soil pipe	Not permitted.		300,000	6 to 24
Richmond	Combined	No treatment contemplated	Manhole covers	No	Yes		10 to 24
Elkins, W. Va	Combined	Irrigation	Manhole covers and house con't'n inlets.	No	Yes	15,000	12 to 20
Fairmont	Separate	Discharges into Monongahela river		Yes		68,925	6 to 15
Charlotte, N. C	Separate	Septic tanks and contact beds. Sludge not removed.	Manholes and soil pipe	Old, yes; new, no.	No	102,000	8 to 24
Salisbury, N. C	Separate	Septic tanks	Manholes and vent stacks.			105,600	6 to 18
Charleston, S. C	Separate	No treatment contemplated	Through soil pipes	No	Some	21,000	8 to 15
Orangeburg	Separate	Discharges into river	Manhole covers	Yes		56,615	8 to 24
Rock Hill		Bonds voted for sewerage system					
Americus, Ga	Separate	Discharges into creek. No treatment contemplated.	Manholes, vents and stacks.	Yes	Yes	40,209	8 to 18
Brunswick	Separate	Pumped into river		No	Yes	130,000	8 to 24
Elberton	Sanitary only	Septic tanks. Irrigation	Manholes	No		15,000	6 to 15
Macon	Separate	Discharges into river. No treatment contemplated.		Yes	Yes	248,160	8 to 24
Daytona, Fla	Separate*	Discharges into Halifax river; salt water		No	Yes	12,000	6 to 15
Jacksonville	Separate	Discharges into St. Johns river. No treatment contemplated.	Manholes and house vents.	No	Yes	332,600	8 to 24
OHIO VALLEY							
Alliance, Ohio	Separate	Chemical precipitation. New plant to be built. Sludge taken by farmers for fertilizer.	Manholes and soil pipes	No		92,400	6 to 24
Ashtabula	Both		Manholes and soil pipes	Some	Yes	111,460	8 to 24
Bellaire	Combined		Lamp-holes	Yes	Yes	No rec'rd	8 to 24
Bowling Green	Separate	Screening	Manhole covers	Yes	Yes	23,000	8 to 36
Canton	Separate	Chemical precipitation. Plans under way for remodeling plant. Sludge spread on land.	Manhole covers	No	Yes	377,044	4 to 20
Chillicothe	Separate	Discharges into Scioto river	Manholes and house connection vents near buildings.	Yes	Yes	95,000	6 to 36
Cleveland	Combined	Discharges into Lake Erie. No treatment contemplated.	Manhole covers	Yes	Yes	855,772	6 to 30
Columbus	Both	Screening, sedimentation, septic tanks and sprinkling filters. Completed Nov., 1908. Sludge blown into river during floods.	Manhole covers	Yes	Yes	No rec'ds	
Conneaut	Separate	Discharges into river. No treatment contemp'td.	Through soil pipes	No	No	110,950	8 to 36
Coshocton	Separate	No treatment.	Manholes and soil pipes	No	No	68,600	8 to 30
Dayton	Separate	No treatment contemplated	Manhole covers	No	Some		Less than 30
Delaware	Separate	Septic tanks. Plant to be enlarged this summer. Sludge buried.	Manhole covers	Yes	Yes		8 to 24
Fostoria	Combined	Septic tanks, irrigation and sand filters. Sludge used as fertilizer.	Manhole covers	Yes	Yes	134,640	8 to 24
Greenville	Separate	Disposal plant probable this year	Through soil pipes	No	Yes	84,000	6 to 15
Lancaster	Combined		Manhole covers	Yes	Yes	33,000	6 to 24
Marion	Separate	Septic tanks, stone contact beds and sand filters. Little sludge. Can burn in garbage crematory.	Manhole covers	Some	Yes	110,900	6 to 18
Newark	Combined	No treatment contemplated	Manhole covers	Yes	Yes	63,400	10 to 24
Norwood	Separate	Discharges to Ohio river. Part pumped	Manhole covers	Yes	Yes	200,000	8 to 24
Ravenna	Separate	Screening, sedimentation, sand filters. Constructed 1908. Sludge drained on sludge beds and buried or given away.	Through soil pipes	No			
Sandusky	Combined	No treatment contemplated	Manhole covers	Yes	Old, yes; new, no.	162,720	6 to 24
Springfield	Separate	Septic tanks (adopted but not installed)	Manhole covers	Yes	No	71,301	6 to 24
Toledo	Both	Sand filter	Manhole covers	Permitted since 1905	Yes	436,465	6 to 24
Wellsville	Sanitary and storm	Discharges into Ohio river	Manhole covers	Yes	Yes	100,000	8 to 20
Wooster	Combined	Discharges into creek	Manholes and lamp-holes.	Generally.	Yes	50,000	6 to 24
Bloomington, Ind	Separate	Septic tanks and sprinkling filters (now nearing completion).		No		55,000	8 to 24
Brazil	Both	Treatment contemplated for immediate future	Soil pipes	No	Yes	61,780	6 to 36
Huntington	Combined	"Stream pollution"	Manhole covers	Yes	About ½	43,000	10 to 24
Ligonier	Separate	Discharges into river. No treatment contemp'td		No	Yes	20,500	8 to 18
Marion	Both	Will treat sewage when forced to do so	Manhole covers	Not gen'lly	Generally.	163,680	8 to 30
Martinsville	Separate	Treatment necessary in immediate future	Manhole covers	Yes	Yes	30,000	8 to 18
New Albany	Separate	Discharges into river	Manhole covers	Yes	Yes		8 to 24
South Bend	Combined		Manholes and inlets	Yes	No	252,437	10 to 30
Wabash	Both	Discharges into river. No treatment contemplated.	Manholes and catch basins.	Yes	Yes	58,600	6 to 24
Aurora, Ill	Combined		Catch basins	Yes	Yes	241,500	8 to 36
Canton	Combined	No treatment contemplated	Manhole covers	No	Yes	87,680	10 to 30
Champaign	Separate	Septic tanks. Sludge put into sludge pit near t'nk	Manhole covers	No	Yes	185,000	6 to 8
Chicago	Combined	Discharges into drainage canal	Through soil pipes	No	Yes	6,072,000	9 to 20
Clinton	Combined	No treatment contemplated	Manhole covers	No	No	15,200	12 to 30
East St. Louis	Combined	Discharges into river. No treatment contemplated.	Manhole covers	To some extent.	Yes	227,800	10 to 30
Evanston	Combined	No treatment. To discharge into branch of Drainage Canal.	Manhole covers	Yes	Yes	320,000	9 to 36
Galesburg	Combined		Manholes and lamp-holes.	Yes	Yes	116,000	10 to 24
Kewanee	Separate	Septic tanks	Soil pipes	No		102,672	6 to 18
Marengo	Separate	Discharges into river	Manhole covers	Yes	Yes	4,000	18

*House sewers, private; storm sewers, municipal.

CITY	System	Methods of Sewage Treatment, or Disposal	Method of Ventilating Sewers	Are House Connect'ns Trapped	Are There Catch Basins on Street Inlets	Vitrified Pipe	
						Total L'gth, ft.	Diam., Inches
OHIO VALLEY—Continued.							
Mattoon	Combined		Manhole covers		About ½	30,890	8 to 24
Murphysboro	Separate	No treatment contemplated	Manhole covers	Yes		39,600	8 to 15
Mt. Carmel	Separate	No treatment contemplated	Manhole covers	Yes	Yes	27,000	6 to 12
Paris	Separate	Septic tanks. Sludge removed by gravity every 3 months.	Manholes and inlets	Yes	Yes	79,200	8 to 36
Peoria	Both	Discharges into river	Manholes and inlets	Yes	Yes	343,200	6 to 24
Rockford	Combined	No treatment contemplated	Manholes	No	Yes	277,887	8 to 30
Savanna	Both; mostly sep'te.	Discharges in river		Yes	Yes	24,395	8 to 24
Shelbyville	Combined	No treatment contemplated	Manholes	No	No		4 to 15
Streator	Combined	No treatment contemplated	Manhole covers	No	Yes	105,600	8 to 30
Bellevue, Ky	Combined			Yes	Yes	33,800	10 to 30
Frankfort	Combined	No treatment	Manhole covers	No	Yes	26,000	10 to 24
Louisville	Combined		Manhole covers	No	Yes	187,549	8 to 24
Clarksville, Tenn.	Combined	Discharges into river. No treatment contemplated.	Manhole covers	No	About ½	41,000	8 to 24
Knoxville	Separate	Discharges into river. No treatment contemplated.	Manhole covers	Yes	Yes	25,000	6 to 24
UPPER MISSISSIPPI-MISSOURI							
Fargo, N. D.	Combined	Discharges into river	Manholes	Yes	Yes		
Aberdeen, S. D.	Separate	Septic tanks. Sludge run onto sludge beds, dried and hauled away.	Manhole covers	No	Yes	111,000	8 to 30
Deadwood	Separate		Manholes	No		30,000	8 to 20
Battle Cr'k, Mich.	Both	No treatment. None contemplated	Manhole covers	Yes	Few near steep gr'ds	73,273	8 to 24
Bay City	Combined		Manholes	Yes	Yes	482,637	6 to 24
Coldwater	Separate		Manholes	Yes	Yes	81,000	8 to 20
Detroit	Combined		Manhole covers	Yes	Yes	1,221,000	6 to 33
Escanaba	Separate		Manholes	Yes	Yes	80,000	8 to 22
Grand Rapids	Both		Manholes and catch basins.	Old, yes; new, no.	Yes		6 to 30
Holland	Separate	Septic tanks	Manholes	No	Yes	63,360	8 to 24
Hancock	Combined	No treatment contemplated	Manholes and catch basins.		Yes	44,500	8 to 24
Jackson	Combined	Septic tanks and cinder filters	Manhole covers		Yes	106,000	8 to 24
Kalamazoo	Both	No treatment contemplated	Manholes and vent pipes on houses.	Yes	Yes	188,450	8 to 24
Lansing	Both	Discharges into river	Manholes	Yes	Yes	200,000	6 to 18
Manistee		Discharges into river	Manhole covers	No	Yes	65,000	8 to 24
Sault Ste. Marie	Combined	Discharges into river	Catch basins	Yes	Yes	87,100	6 to 30
Traverse City	Combined	Treatment contemplated in near future	Manholes	No	Yes	65,000	6 to 24
Albert Lea, Minn.	Both		Manhole covers	No	Yes	10,428	8 to 18
Anoka	Combined	No treatment	Manholes and catch basins.	Yes	Yes	800	12
Brainerd		Discharges into river. No treatment contemp'td	Manholes		Yes	26,900	8 to 24
Crookston	Combined	No treatment contemplated	Manholes, catch basins and soil pipes.	Some	Mostly	41,250	9 to 30
New Ulm	Combined	Discharges into river	Monhole covers	No	Yes	13,975	12 to 30
Red Wing	Both	No treatment	Manholes	Yes	Business dists. only		6 to 24
Baraboo, Wis.	Combined	No treatment contemplated unless compelled by Legislature.	Manholes and catch basins.	Yes	Yes	40,350	6 to 30
Chippewa Falls	Combined	Discharges into river. No treatment contemp'd	Manhole covers	Yes	Yes	14,675	8 to 24
Fond du Lac	Separate	Septic tanks and contact beds*	Some manholes	Yes	Yes	212,900	8 to 36
Janesville	Separate		Manholes and soil pipes	No	Some†	105,504	8 to 36
La Crosse	Combined	Discharges into river. No treatment contemp'td	Catch basins	Generally	Always		
Marinette	Combined	Discharges into lake. No treatment contemplated.	Manholes and soil pipes	No	Yes	68,000	8 to 24
Sheboygan	Combined	Dischrages into lake. No treatment contemplated.	Manholes and catch basins.	Generally	About ½	195,132	8 to 24
Stevens Point	Separate	Discharges into river	Manhole covers	Yes		10,000	8 to 24
Superior	Combined	No treatment contemplated	Manhole covers	Generally	Yes	162,000	8 to 24
Cedar Falls, Ia.	Separate		Manhole covers	Yes	Yes	46,200	6 to 36
Centerville	Separate	Septic tanks	Manhole covers	Yes		89,000	8 to 15
Clinton	Combined	Discharges into river. No treatment contemp'td.	Manholes and inlets	Yes	Partly‡	79,000	8 to 36
Creston	Separate	Discharges into creek. No treatment contemp'td		Not gen'lly	About ½		
Fort Dodge	Separate	Discharges into river. No treatment contemplated.	Manholes and lamp-holes.	Yes	Yes	79,000	6 to 15
Iowa City	Separate	Discharges into river. No treatment contemplated.	Manhole covers	No		82,000	8 to 12
Keokuk	Combined	Discharges into river. Treatment necessary some day.	Inlets	Yes	Partly§	47,000	6 to 36
Marshalltown	Combined	No treatment contemplated	Manhole covers		Yes	165,000	8 to 24
Missouri Valley	Contemplated						
Oelwein	Separate	Septic tanks and 4 filter beds. Sludge discharges into pond.	Manholes	Yes	No	36,000	6 to 20
Sioux City	Mostly separate	Discharges into river. No treatment contemplated.	Manholes and inlets	Yes	Yes	317,000	6 to 30
Storm Lake	Plans prepared	Septic tanks and filters proposed					
Beatrice, Neb.	Separate	No treatment contemplated	Manhole covers	No	Yes		
Fairbury	Separate	No treatment for some time		Yes		33,600	8 to 12
Gothenberg	Separate		Soil pipes	No		16,360	8 to 15
Grand Island	Combined	No treatment contemplated	Manholes and soil pipes	No	Yes	68,000	8 to 24
North Platte	Separate	Discharges into river. No treatment contem'td.	Manholes and soil pipes	Some**		45,570	6 to 18
York	Separate	Irrigation	Manholes and vents on houses.	Yes	Yes	27,000	8 to 12
Cape Girardeau, Mo.	Both	Discharges into river. No treatment contemp'td.	Manhole covers	Yes	Yes	607,200	8 to 24
Fulton	Separate	Discharges into creek	Manholes	Yes		37,100	6 to 15
Jefferson City	Separate	Discharges into river. No treatment contemp'td.	Manhole covers	Yes	Yes	73,130	6 to 24
Kansas City	Combined	No treatment	Manholes and catch basins.				
Lexington	Separate	No treatment contemplated	Manholes; some house vents.	Generally	Four	15,000	6 to 18
Nevada	Combined	No treatment contemplated	Manholes	Yes	No	30,000	8 to 24
Fort Scott, Kans.	Separate		Manhole covers	No			
Hutchinson	Separate	Discharges into streams	Manhole covers and house vents.	Yes	Yes	164,520	8 to 24
Lawrence	Separate	Discharges into river	Manhole covers	Yes	No	230,000	8 to 21
Wellington	Separate	Septic tanks. Blow sludge into creek during high water.	Manhole covers	Yes	Yes	81,000	6 to 15
LOWER MISSISSIPPI AND GULF							
Wagoner, Okla.	Separate	Septic tanks. Sand filters to be added		Yes		40,000	8 to 15
Birmingham, Ala.	Separate	Septic tanks	Manhole covers	No	No	321,544	6 to 24
Hot Springs, Ark.	Separate	Septic tanks and irrigation	Manhole covers	Yes	No	105,000	4 to 12
Paragauld, Ark.	Contemplated	Contemplate treating					
Canton, Miss.	Separate	Discharges into stream. No treatment for years.	Manholes and soil pipes	No		43,386	6 to 18
Yazoo City	Combined	Discharges into river. No treatment contem't'd	Manholes	No	No	53,000	4 to 18

*Has not been in service for several years. †Some combined catch basins and manholes used. **Not recommended.
‡Used where sewer is 36 inches or smaller; not used if sewer is larger. §On business streets only.

CITY	System	Methods of Sewage Treatment, or Disposal	Method of Ventilating Sewers	Are House Connect'ns Trapped	Are There Catch Basins on Street Inlets	Vitrified Pipe	
						Total L'gth, ft.	Diam., Inches
LOWER MISSISSIPPI and GULF—Cont'd.							
Baton Rouge, La.	Separate	No treatment contemplated	House connections	No	Yes	79,000	8 to 24
New Orleans	Separate	Discharges into river	Soil pipes	No		1,500,000	8 to 36
San Antonio, Tex.	Separate	Irrigation	Manholes	Yes		356,825	8 to 24
Tyler	Separate*	Discharges into creek			No	{	10
						{ 3,000	12 to 30
ROCKY MOUNTAIN							
Boise, Ida.	Separate	No treatment contemplated	Manhole covers	Yes		.....	.....
Anaconda, Mont.	Separate	Chemical precipitation. Sludge into pond through smelter ditch.	Manholes	Yes	No	68,000	6 to 18
Billings	Combined	No treatment. Probable in a few years	Manhole covers	No	Yes	80,000	8 to 36
Helena	Separate	Irrigation	Manholes	Yes		67,200	6 to 28
Cheyenne, Wyo.	Separate	Discharges into stream. Septic tank and irrigation contemplated.	Manholes and soil pipes	No	Yes	64,080	8 to 16
Laramie	Combined	Irrigation	Manholes	Yes	Yes	74,000	8 to 12
Ogden, Utah	Separate	No treatment contemplated	Manholes and soil pipes	No		137,069	8 to 24
Provo	Separate	Discharges into canal	Manholes and soil pipes	Yes		41,963	6 to 21
Salt Lake	Separate		Manholes and house vents.	No		520,799	6 to 24
Grand Junc'n, Col.	Separate	No treatment contemplated		No		68,000	6 to 15
Leadville	Separate	Screening and sedimentation	Manholes			10,837	6 & 8
Reno, Nevada	Combined	Treatment within two years contemplated	Manholes and air pipes§	Yes	Yes	49,000	6 to 30
PACIFIC							
Aberdeen, Wash.	Separate	Discharges into bay. No treatment contemplated.	Manholes and vents at ends of laterals.	Yes	Yes	75,000	6 to 24
Bellingham	Both	Septic tanks. Sludge pipe into creek, never used	Manholes	Yes	Yes	.....	.....
Everett	Both	Discharges into salt water. No treatment needed	Manholes	Yes	Yes	151,000	6 to 24
Seattle	Combined	Discharges into sound and lakes	Manholes and soil pipes	No	Yes	993,000	8 to 24
Portland, Ore.	Combined	Discharges into river. A few small septic tanks.	Manhole covers		Yes†	958,000	6 to 24
Alameda, Cal.	Separate	Discharges into bay	Manholes and soil pipes	No		.....	6 to 12
Pasadena	Separate	Irrigation	Manholes and house vents.	No		441,000	8 to 18
San Bernardino	Separate	Irrigation				.....	8 to 12
San Francisco	Both	Discharges into bay	Manholes	Yes	Yes	.....	.....
Santa Monica	Separate	Electrolytic treatment for deodorization	Vent pipes‡			131,800	6 to 24
Stockton	Separate	Pumped into river. No treatment contemplated.	Manholes and house vents.			750,000	6 to 24
Visalia	Separate	Irrigation	Manholes and house vents.	Yes		103,000	8 to 18

*Sanitary sewers private; 12 to 30-inch storm sewer municipal. †Also combined catch basins and manholes. ‡Vent pipes from manholes connected to poles on masts near the curb line. §Air pipes are 4-inch tees extended to the surface, spaced 400 to 600 ft. apart.

Synopsis of Table

The data in the above table which refer to the ventilation of sewers and to the use of catch basins have formed the basis of articles on other pages of this issue. Below is given a synopsis of the information contained in the other columns.

Systems.—In 37 New England cities there are 15 combined systems, 14 separate, and 8 cities have both. In 41 Middle Atlantic cities there are 16 combined systems, 15 separate, and 10 have both. In 15 South Atlantic cities there are 2 combined systems, 12 separate, and one has both. In 57 Ohio Valley cities there are 24 combined systems, 25 separate, and 8 have both. In 60 Upper Mississippi-Missouri cities there are 22 combined systems, 26 separate, and 8 have both. In 10 Lower Mississippi and Gulf cities there are one combined system and 8 separate, with one not specified. In 12 Rocky Mountain cities there are 3 combined systems and 9 separate. In 12 Pacific Coast cities there are 2 combined systems, 7 separate, and 3 have both. These figures indicate that in the New England, Middle Atlantic and Ohio Valley States the numbers of combined and separate systems are about equal; while in other sections the separate systems far outnumber the combined. While situation relative to tidal waters and large rivers undoubtedly has considerable effect upon the choice of system, it seems probable that the prevalence of the separate system in the newer cities is due to its increasing use in recent years.

Disposal.—Of the New England cities 26, or 70 per cent, do not purify their sewage in any way. As preliminary treatment, 2 use screening, 2 sedimentation, one uses both, and 2 chemical precipitation. Only 8 oxidize the sewage, all by sand filtration. The sludge is dumped on the ground by 3, on sludge beds by one, in a swamp by one, 3 bury it, 3 use it as fertilizer, and 2 press it and remove it in scows.

Of the Middle Atlantic cities, 8 use septic tanks, and one sedimentation as preliminary treatment, 4 of these first screening the sewage. For final treatment 3 employ contact beds, 2 sprinkling filters, one sand filters and one irrigation. The sludge is plowed in by one, dried on beds and used as fertilizer by 2, and deposited in the river by one. No purification is attempted by 31, although several are taking active steps toward this.

Of the Ohio Valley cities, 7 report using septic tanks (4 without other treatment), 2 sedimentation, 2 chemical precipitation and 3 screening. For final treatment 2 use sprinkling filters, 4 sand filters, one contact beds and one irrigation. No purification is attempted by 40, but 3 are taking steps toward it. Sludge is used as fertilizer by 2, dried on land by 3, buried by 3 and put into a river by one.

Of the Upper Mississippi-Missouri cities, 8 report using septic tanks (4 without other treatment), no other kinds of preliminary treatment being reported. For final treatment, 2 use sand filters, and irrigation, cinder filters and contact beds are each used by one. No treatment is attempted by 41. One discharges sludge into a pond, 2 into a creek and one onto a bed.

Of the Lower Mississippi and Gulf cities, 3 use septic tanks (2 without further treatment), one sand filters and 2 irrigation. Six do not treat the sewage.

Of the Rocky Mountain cities, one uses chemical precipitation alone, one screening and sedimentation and 2 irrigation. Eight do not treat the sewage, but 3 contemplate it.

Of the Pacific Coast cities, one uses septic tanks alone, one electrolytic treatment and 3 irrigation. Seven do not treat the sewage.

Sewer Sizes.—The minimum sizes of pipe used for house sewers is an interesting point. These minimums are as follows: In New England, 8-inch in 17 cities, 6-inch in 13, 4-inch in one. Middle Atlantic, 8-inch in

15, 6-inch in 11, 4-inch in one. South Atlantic, 8-inch in 7, 6-inch in 6. Ohio Valley, 9-inch in one, 8-inch in 23, 6-inch in 17, 4-inch in 2. Upper Mississippi-Missouri, 9-inch in one, 8-inch in 31, 6-inch in 18. Lower Mississippi and Gulf, 8-inch in 4, 6-inch in 2, 4-inch in 2. Rocky Mountain, 8-inch in 4, 6-inch in 7. Pacific coast, 8-inch in 4, 6-inch in 6. All districts, 9-inch, 1 per cent; 8-inch, 54.4 per cent; 6-inch, 41.5 per cent; 4-inch, 3.1 per cent.

Amount and Size of Cement and Concrete Sewer

City	Cement Pipe		Concrete Pipe		Concrete Sewer	
	Total Length, Feet	Diameters, Inches	Total Length Feet	Diameters, Inches	Total Length Feet	Diameters, Inches
NEW ENGLAND—						
Bangor, Me.	7,000	8 to 12				
Portland.	86,458					
Concord, N. H.					1,450	60
					246	42
Dover.	6,000	6 to 24			328	20
Portsmouth.	Unkn'wn	6 to 12			1,560	48
					900	40
Everett, Mass.			9,360	36 x 38	350	36 x 38
			400	36		
New Bedford.	9,279 [1]	10 to 19 x 24			57	72
					110	3 x 7
					641	6 x 4
Newton.					5,987	20 x 30
Springfield.	131,219	8 to 18			12,673	24 x 36 to 87 x 58
Worcester.	Inc. in vitrified				6,917	24 to 60
Pawtucket, R. I.	1,300	20 x 30 and 24			950	52
					2,000	56
Providence.					5,173 [2]	20 to 56
Hartford, Conn.	9,647	10 to 15			1,650	120
					536	36
					615	34 x 51 egg
					2,803	48 x 102 horseshoe
New Britain.					4,615	36
Norwalk.	1,800	24			1,142	27
MIDDLE ATLANTIC—						
Hoboken, N. J.	Old time	rs, no re	cords.			
Newark.			2,936	42	2,028	36
			314	36	355	48 x 66
			375	27	1,331	42 x 54
Plainfield.	600	18	260	33	867	36 x 48
Rutherford.	5,000	18 to 24				
Allentown, Pa.					575	40
					242	45
					336	54 x 100
					450	81 x 100
Altoona.					900	24 to 30
					2,450	30 x 45 to 36 x 54
					2,250	66 x 102
Clearfield.					200	84 x 42
Harrisburg.					2,100	84 x 48
					900	72 x 60
					1,600	66
					1,200	60 x 48
					7,178	60
					7,688	48
					956	36 x 48
					800	36 x 40
Oil City.					90	30 x 48
					100	30 x 36
Stroudsburg.					500	24 x 36
					1,200	26 x 39
					1,200	34 x 51
					500	44 x 66
Williamsport.					515	90 x 54
					860	60
					1,750	48
					870	42
					880	36
SOUTH ATLANTIC—						
Macon, Ga.	720	36				
OHIO VALLEY—						
Chillicothe, O.			940	30	5,200	8 x 10
			1,900	24		
Cleveland.	1,358 [3]	11 x 17 & 13½ x 19½	4,133	27	23,319	120 to 162
			2,667	30		
			55	33		
			1,033	39		
Columbus.			8,800	24		
			410	36		
Dayton.					1,250	60
					1,140	54
					1,210	48
Lancaster.			11,600	30 to 60		
Norwood.					500	60
					2,000	48
					2,000	36
OHIO VALLEY—Cont.						
Sandusky, O.			1,094	24	2,200	48 x 60
			1,110	27	2,300	42 x 48
			1,335	24 x 36	1,100	42 x 42
Springfield.					260	27
					3,692	30
					1,255	33
					2,292	36
Toledo.					30,578	24 to 102
Brazil, Ind.					5,800	
Huntington.					1,285	18 x 27
South Bend.			311	30	3,443	66 and 72
			291	27	2,444	66
Wabash.					2,868	36 x 54
					1,850	16 x 24
Chicago, Ill.					3,680	108
					7,740	102
					6,640	96
					3,420	90
					3,340	84
East St. Louis.					28,000 [4]	
Mattoon.					600	60
					2,000	48
					2,000	36
Paris.	5,000	15 to 24		20 to 48		
Savanna.			3,350	8 to 24		
Louisville, Ky [5].						
Knoxville, Tenn.			4,000	36	1,579	30
UPPER MISSISSIPPI - MISSOURI—						
Aberdeen, S. D.			800	24		
			1,600	36		
Battle Creek, Mich.					504	48 x 32 rect.
					864	42 x 45
					653	36
					856	39 x 58
Bay City.			2,280	30	8,000	36
			7,017	36		
Coldwater.					1,588	42
					955	36
					836	24
Grand Rapids.			1,270	48		
			6,094	30		
			3,628	27		
			561	24		
Jackson.	15,000	30 and 48	13,824	48		
Kalamazoo.					2,446	30
					687	33
					3,532	36
					1,616	42
					4,971	48
					1,500	54
Manistee.	2,000	12 x 18				
Albert Lea, Minn.					2,000 [6]	
New Ulm.					3,790	33 to 54
Red Wing.					1,318	72 and 42 x 66
Baraboo, Wis.					2,230	36 and 42
Fond du Lac.					1,360	30
					3,100	12 x 24 rect.
Janesville.			8,407	48		
			137	36		
			1,797	27		
Superior.	5,715	15 to 24				
Cedar Falls, Ia.					400	48
Clinton.					1,956	75 x 120
					1,350	75 x 108
					880	69 x 96
					785	63 x 84
					740	63 x 72
					810	66 x 54
					799	60 x 51
					2,605	66 to 42 round
Iowa City.	1,400	18				
Sioux City.					1,200	30 and 48
Kansas City, Mo.					15,000	26 to 96
Lexington.					186	36 x 51
LOWER MISSISSIPPI AND GULF—						
New Orleans, La.					17,718	39 to 69
San Antonio, Tex.					1,000	36
ROCKY MOUNTAIN—						
Billings, Mont.			3,500	96		
Helena,	81,300	6 to 12				
Boise, Ida.					76,222	36
Salt Lake, Utah.					2,978	30
					4,836	36
					5,521	40
					5,020	32 x 42
					36,151 [7]	38 to 64
PACIFIC—						
Bellingham, Wash.			4,200 [8]	8 to 20	1,500	96 x 60
					1,000	54 x 48
					600	48 x 36
					1,500	63 x 33
					1,200 [8]	72 x 39
					4,200 [8]	60 x 30
Seattle.					29,000	42 to 138
Portland, Ore.	No rec'rd	9 to 12			800	32 to 40
					8,785 [8]	32 to 66
San Bernardino, Cal.			No r'c'd	30		

[1] None laid for over 20 years.
[2] Includes some concrete pipe.
[3] Cement pipe no longer used.
[4] Under contract.
[5] About $4,000,000 being spent for reinforced concrete sewers.
[6] Not yet constructed.
[7] Concrete invert with brick arch.
[8] Planned but not constructed.

SEWERS AT CAIRO, ILL.

Drainage Necessary Because of Ground Water—Concrete Trunk Sewer, Most of it Without Reinforcement —Some Construction Details

THE city of Cairo, Ill., is just about completing a main trunk and outfall sewer which is the last link in a complete system which will relieve the city from the inconvenience and expense that has been caused annually by the rise in the Ohio River.

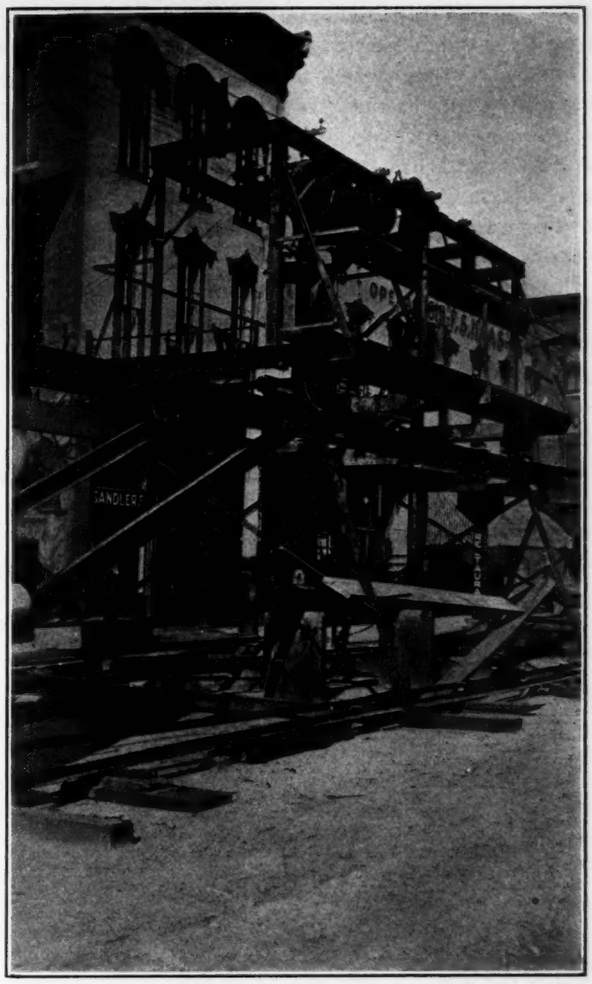
Previous to 1903 practically no system of sewers or method of drainage existed in the city. Every spring the residents took it as a matter of course that their cellars should be flooded and their streets covered with water. This was caused in some cases by an overflowing of the levees, but most of it came up through the ground by seepage from the high water in the Ohio River. It is stated, but not vouched for, that boat races were held on or in the main street of the city at times of high water.

Cairo is situated at the junction of the Ohio and Mississippi Rivers. On the Mississippi side little trouble is experienced because of the good levee system and the character of the soil. But trouble has always been experienced from the Ohio side during the rise in that river in March and April and also in May or June when the Mississisppi backs the water into the Ohio, since the city rests on a bed of sand which readily allows seepage when the river is high.

As stated before, the citizens took the flooded condition as a matter of course and did not believe that it could be remedied, but Mayor Parsons thought differently, and on his own initiative bought and installed a pump to demonstrate to the people what could be done. His plan was a success, and the people were glad to spend the money for a sewer and drainage system and the necessary pumps. The pumps were installed and connected to some old brick sewers; and inasmuch as it was desired to pave certain streets, a number of smaller sewers, connecting with these old brick sewers, were constructed before work was started on the main trunk sewer.

This trunk sewer extends for nearly forty blocks along Commercial avenue, which is the second street from the river. It is built of concrete, unreinforced, with circular interior and horseshoe exterior. The size varies from six to four feet internal diameter. The thickness of the sewer walls is three inches plus as many inches as the sewer is feet in diameter. This gives a rather heavy section, but it was thought necessary because of the excessive ground water pressure to be handled. A six-foot reinforced outlet extends from Commercial avenue and Tenth street to the river. Connection is made from this to a pump house located at Tenth street, and another pump house is also connected at Twenty-eighth street.

STARTING SEWER OUTLET ON OUTSIDE OF LEVEE, CAIRO



CARRIER OF SEWER EXCAVATOR, CAIRO

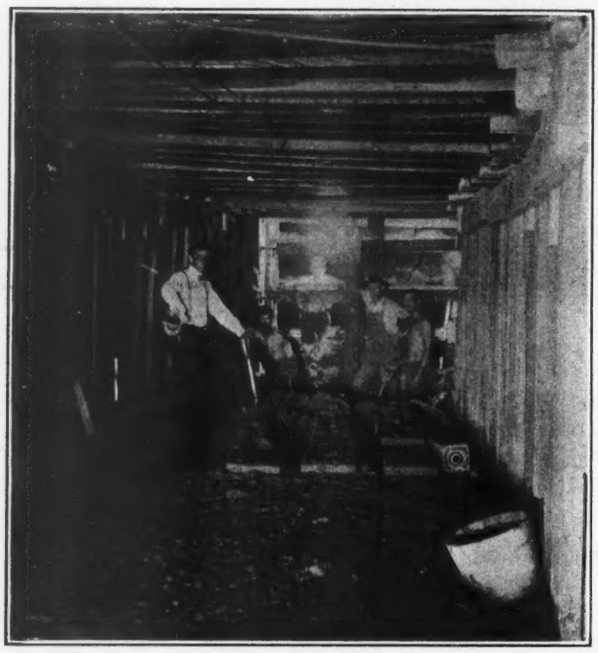
In constructing the sewers, the excavating apparatus shown in the accompanying photograph was used. This consisted of a track laid on the ground outside the edges of the trench, which supported a steel trestle work carried on rollers. This track was for convenience in moving the trestle. On top of the trestle was another track which supported a movable car operated by cables from a house at one end of the trestle. This car was arranged with hoisting drums and cables which raised and lowered buckets to the trench. The actual excavation was done by hand, but the transportation of the earth was by means of the car, the excavated material being deposited on the completed section of the sewer. The materials for the concrete were delivered alongside the trench, where they were mixed in a Buf-

talo mixer and delivered to position by means of chutes. Blaw collapsible centers were used on the work.

The soil through which the sewer runs is of such a character that sheeting was necessary at all points. For the most part wooden planks were used. Some little quicksand was found in spots, but usually caused no trouble. Also some water came into the trench, but this was taken care of by a centrifugal pump driven from a traction engine.

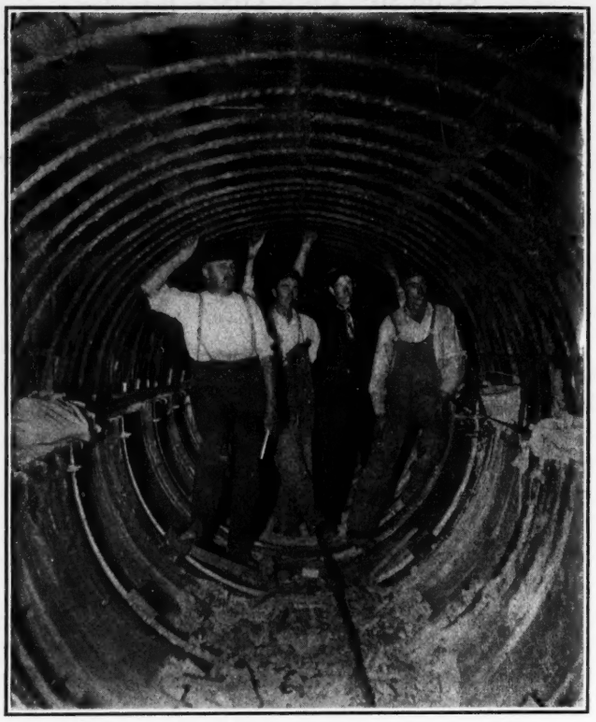
Probably the most interesting section of the work was that extending from Commercial avenue to the river. Here very deep excavation was necessary, and the levee wall had to be tunneled. Some slight trouble was experienced here, during one of the high water stages, by the water working back along the exterior of the pipe and washing behind a temporary bulkhead placed to prevent such action. This section extends through the levee at a very flat grade and then suddenly drops at a 24 per cent grade to low-water mark in the river.

The Ohio River has a maximum range of rise and fall at this point of 52 feet. The outlet of the sewer is



TUNNELING UNDER LEVEE, CAIRO

24 feet below maximum high water, so that it is necessary to pump only when the river is above this point. Usually pumping is not necessary until the river is at least ten feet above this point. To provide for the pumping, when necessary, a branch runs from the sewer to the pumping house on Tenth street. Between this point and the river a huge automatic gate six feet in diameter and weighing five tons has been installed. This gate when seated makes an angle of 15° with the vertical, so that its normal position, unless there is an outward flow of sewage, is always closed. This makes it possible for a river head which is less than the sewer head to keep it closed. The sewage is pumped by a Menge cable-driven centrifugal pump with a rated capacity of 1 1-4 million gallons per hour, and is returned to the outfall sewer through the same manhole

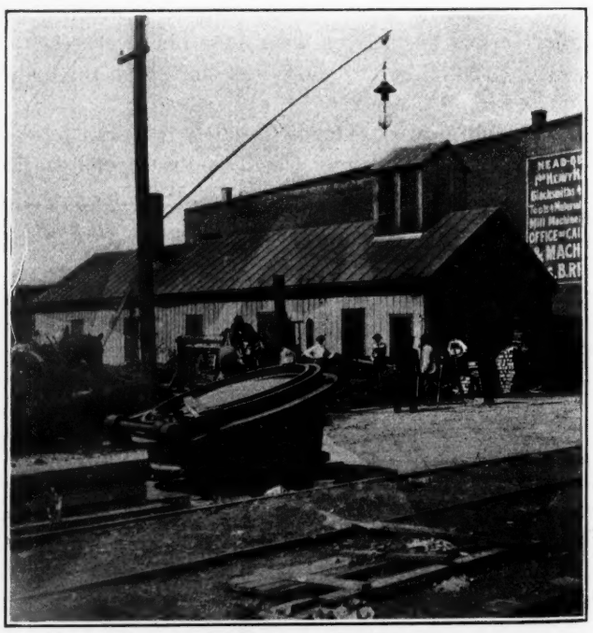


CONSTRUCTING SEWER IN TUNNEL, CAIRO

by which access is had to the gate. Beside the gate already mentioned a second gate is placed in the outfall beyond the levee. It is not intended that this shall be used except in emergency.

Either or both of the pumping stations mentioned can be operated at one time. However, an auxiliary gate is provided, so that the flow can be divided, part going to one pump and part to the other.

Recently a portion of the completed sewer settled, but owing to the height of the ground water it has been impossible as yet to make an examination to determine the cause or extent of the damage. It is surmised, however, that a cap was left off an inlet and that the in-



AUTOMATIC GATE AND PUMPING STATION, CAIRO

rushing ground water washed the sand from around the pipe, thus causing the trouble.

The Rich Construction Co., of St. Louis, secured the contract for the work, which will total $108,900. The successful bid was as follows:

415 feet	6-foot reinforced sewer	$32.00 per foot
1,550 feet	6-foot unreinforced sewer	12.00 " "
3,035 feet	5½-foot unreinforced sewer	8.40 " "
1,531 feet	4½-foot unreinforced sewer	6.50 " "
3,185 feet	4-foot unreinforced sewer	$6.00 and 6.50 " "

Mr. W. B. Thistlewood, City Engineer of Cairo, has been in charge of the work, and to him we are indebted for much of the information.

REINFORCED CONCRETE BLOCK SEWER

Constructed in Bath, Me.—Moulded in Four Segments—Methods of Construction and of Laying—Difficult Construction in Wet Trench

By STEPHEN LITCHFIELD, City Engineer of Bath, Me.

To provide with trunk sewers three drainage areas having a total area of about 1,300 acres was the problem confronting the city of Bath, Me., and which was successfully completed, with the exception of certain maintenance clauses, December 1, 1908.

The old outlets which the new one was to replace consisted in one case of an open ditch leading to an old stone highway culvert, from which a timber sewer had been laid to the river. The grade was very flat, and consequently the soil was saturated with sewage. As the flow was through the populated and business section of the city, the conditions were extremely unsanitary. The lower ends of the other systems were in equally as bad condition. At the south end of the city, from the ends of the mains as constructed, the flow was in open ditches to a pond which was partially drained at low tide. At the north end of the city the sewage was turned onto a large section of low, swampy land, which had become a nuisance.

The city of Bath is situated on the west bank of the Kennebec River. The populated section covers an area of about three square miles, extending about three miles north and south with the river. The population in 1900 was 10,477.

After the usual preliminary surveys and plans had been made, various types of sewer were considered, and bids were asked for brick, monolithic concrete and Parmley reinforced concrete blocks. On opening the bids it was very evident that the block construction was by far the most economical. Doubts were entertained in the minds of the Sewer Commissioners and others interested as to the advisability of any form of concrete construction.

A committee was appointed, consisting of one member of the Commission and the City Engineer, to investigate further. The committee visited various cities in Massachusetts, including Boston, Cambridge, Everett and Holyoke, and reported that, from what they had heard from prominent sewer engineers and especially from what they had seen, Portland concrete was the ideal material for sewer construction. The work was accordingly let to the Hanscom Construction Company, of Boston, for the reinforced concrete block type, the plans for which were prepared after the design and patents of Walter C. Parmley, consulting engineer, of New York. The cut on page 796 shows the details of construction. The quantities of material required per running foot were as follows:

QUANTITIES PER LINEAR FOOT

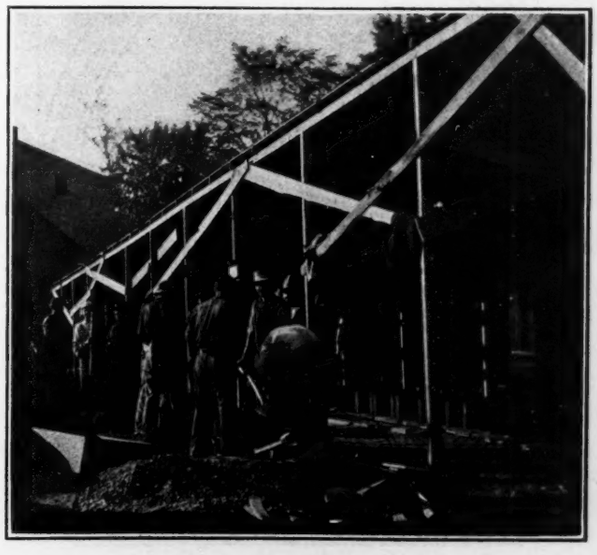
DIAMETER, D	THICKNESS, T	CU. FT. CONCRETE	STEEL ROD	WT. OF ROD
27 ins.	2½ ins.	1.69	5/16 in.	2.98 lbs.
30 "	2½ "	1.86	⅜ "	4.47 "
33 "	2¾ "	2.25	⅜ "	4.84 "
36 "	3 "	2.68	⅜ "	5.24 "
42 "	3½ "	3.65	⅜ "	6.02 "

The total number of feet constructed was 5,545, the sizes varying from 42-inch to 27-inch diameter. The contract prices per linear foot, including cost of forms and materials, placed and ready for use, but exclusive of excavation and preparing foundations, were as follows: For 42-inch, $1.75; 36-inch, $1.35; 33-inch, $1.18; 30-inch, $1.04; 27-inch, $.94.

The block sewer was something of a novelty in sewer construction and was believed to be especially adapted to this particular work.

The grade at the outfall of the two sewers which flow directly to the river is about two feet above mean low water, and because of the topography the grade is necessarily made flat in order to drain the lower portions of the city. Portions of the land through which about 1,500 feet of the 42-inch sewer passes is made land. It is within the memory of many of the old inhabitants that tide-water covered portions of this section. For this reason, and because the filling of this land was started on a substantial base of massive logs, it was a difficult section to handle. Although these logs had been submerged for upwards of half a century, the contractor found them in a perfect state of preservation. The tide still flows through this coarse filling for about 800 feet inland.

The contractor's outfit consisted of the usual hand tools, team for transporting blocks and materials, gravel



BLOCKS IN PROCESS OF CONSTRUCTION

screens, six cast-iron moulds, a supply of pallets on which to place the blocks while moulding as well as to furnish a place on which they could rest until hard enough to be handled; also a supply of circular wooden strips to insert in the moulds to form a ¾-inch projecting lip on the forward end of side and top blocks. Concrete for making blocks consisted of Portland cement one part, sand two parts, screened gravel stone three parts, by volume. The blocks were allowed to get a hard set before transporting to the work.

The completed ring on all sizes of sewer consists of four blocks, and the moulds are so arranged that the four blocks are made from the same mould. Four men worked at each mould and blocks were made continuously. In the top and bottom blocks round steel rods, bent to the proper shape, were inserted midway as the blocks were moulded. Blocks are one foot long. On the forward end of side and top blocks is the ¾-inch projecting lip which allows space for the circular steel rib and for embedding the same in a mortar joint. The bottom blocks, with plain butt joints, break joints with the blocks above. In laying the blocks no forms were required in the trench, with the exception of wedges with which to hold the blocks in place until the trench was back-filled to the springing line.

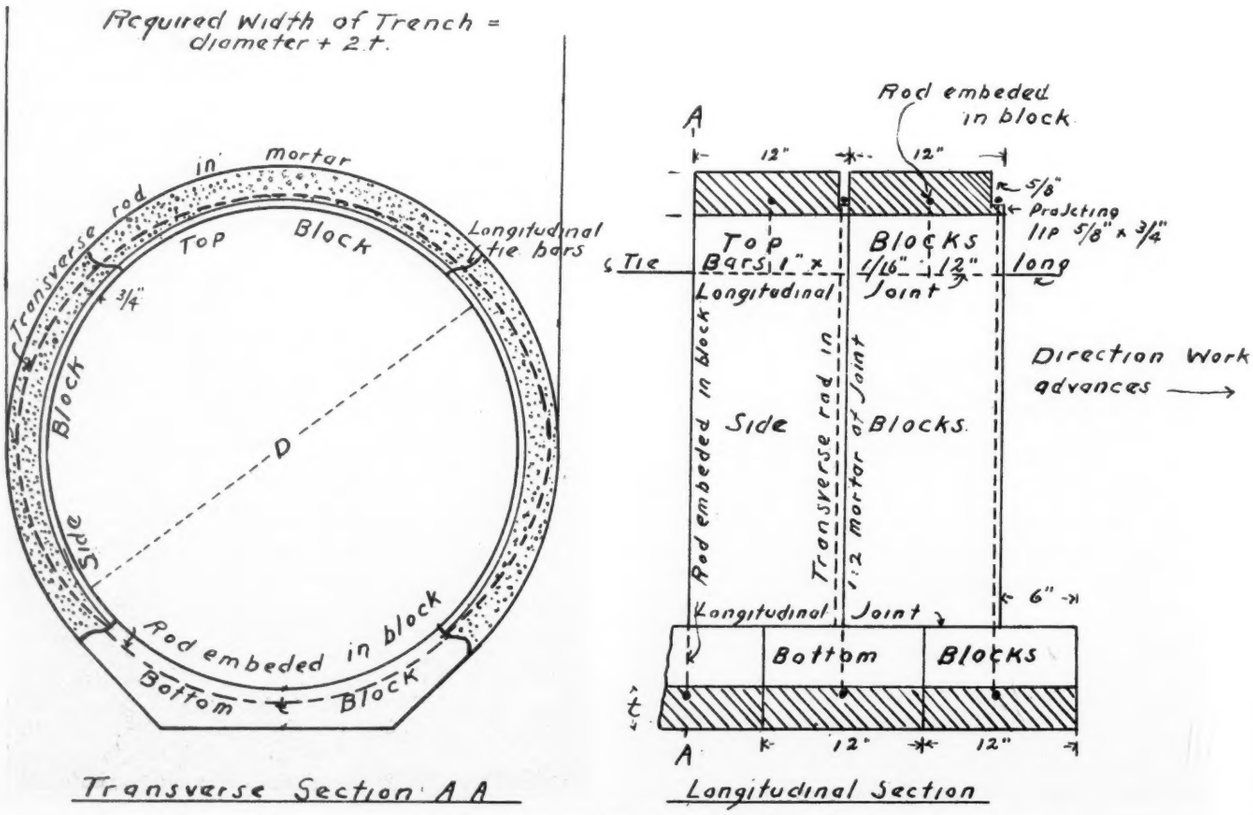
The longitudinal steel was placed in the mortar forming the joints between the blocks as these were laid up, and consisted of strips 1/16 x 1 x 12 inches, breaking joints 6 inches on each block.

No skilled labor was required in laying the blocks, two sewer workers of ordinary intelligence laying from 30 to 60 feet per day. One man was kept on the inside of the completed section making up joints and washing the same with a cement wash. Blocks were inspected before going into the trench and, in case an inferior bag of cement had been used, it was easily detected and thrown out before going into the work.

A short section of 60 feet in length was constructed in tunnel and the blocks were found to be especially adapted to this section. In constructing this type of sewer, the bottom block is laid considerably in advance of the ring, and a perfect line and grade can be obtained. No under drains were required, the water being handled with hand pumps.

On the lower section of the 42-inch sewer much difficulty was encountered with tide-water, and the blocks were found well adapted to this condition. As much of the ring as possible was set up and the joints cemented during the low tide, but many times the mortar in the joints last made up would not stay on account of the water rising so quickly, and these joints had to be gone over several times before they were perfectly tight. Through a portion of this wet section, after completing the rings, the whole was reinforced with additional concrete. This section also passes under tracks of the Maine Central Railroad freight yard.

The advantages which we found in the block construction consisted, first, in the low cost as compared with the other types, which a glance at the contract prices will show. No forms were needed in the trench, thus avoiding the constant delay and expense of placing and removing forms. In the sections reached by tide-water there was the advantage of the concrete having a hard set before going into the work, thus eliminating



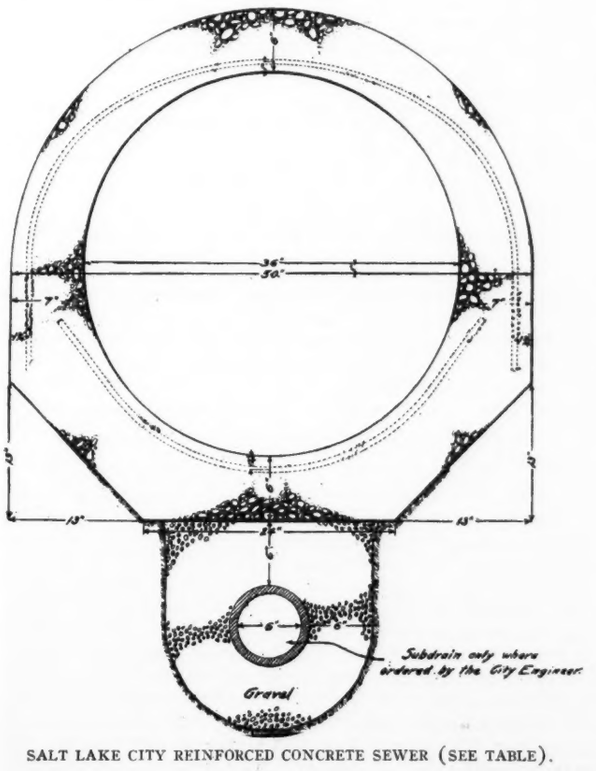
Transverse Section A A — Longitudinal Section

REINFORCED CONCRETE BLOCK SEWER

SEWER INVERT IN WET TRENCH

the action of tide-water on the green cement. It was impossible to keep the water down on account of the porous condition of the soil adjacent to the river, where the tide has a rise and fall of from seven to nine feet. Skilled labor was not required on any part of the work, excepting on manholes, which were constructed of brick masonry.

An inspection of the completed work shows no deformities caused by settlements of the concrete rings, and practically a tight sewer. There is every indication that the construction is of a strong and permanent nature.



SALT LAKE CITY REINFORCED CONCRETE SEWER (SEE TABLE).

COST OF CONCRETE PIPE

THE following data, obtained from a number of cities, give the nature and cost of concrete pipe of various sizes, their thickness, etc. Other data, such as nature of excavation, cost of sand and stone, etc., would give more value to the cost prices; but we believe that they will be found of value in giving approximate ideas on these points.

PRICES OF CONCRETE PIPE

City	Length in Feet	Diameter in Inches	Reinforced	Thickness of Shell in Inches	Cost per Lin. Ft.
Everett, Mass.	400	36	Yes	3	$1.70
Newark, N. J.	2,936	42	Parmley system	3½	‡3.00 to 4.35
	314	36	" "	3	‡3.76
	375	27	" "	2½	‡2.60
Plainfield, N. J.	260	33	Parmley block	3	‡3.60
Cleveland, O.	4,133	27	Parmley system	..	2.78
	2,667	30	" "	..	3.49
	55	33	" "	..	3.96
	1,033	39	" "	..	2.90
Columbus, O.	8,800	24	Yes	3	1.20
Lancaster, O.	410	36	"	4	2.00
	4,065	60	"	6	2.50
	2,200	48	"	5	2.00
	1,000	36	"	4	1.90
	2,000	36	"	4	1.95
	2,335	30	"	3½	1.85
Sandusky, O.	1,094	24	"	2½	1.00
	1,110	27	"	2½	1.15
	1,335	24 x 36	"	3	1.50
South Bend, Ind.	311	30	Jackson R. C. P. Co.'s	3½	‡2.85
	291	27	ditto	3	‡2.65
Savanna, Ill.	1,500	24	No.	2	*1.00
	850	18	"	1½	*.65
	600	12	"	1	*.31
	400	8	"	¾	*.20
Boone, Ia.	.....	24	"	2½	†.50
	.....	22	"	2	.45
	.....	20	"	1¾	.40
	.....	18	"	1½	.35
	.....	16	"	1¼	.25
	.....	15	"	1¼	.22½
Janesville, Wis.	8,407	48	Yes	5	**2.00
	137	36	"	4	1.80
	1,797	27		3	1.10
Grand Rapids, Mich.	1,270	48	Yes	5	**2.65
	6,094	30	"	4	1.85
	3,628	27	"	3	1.50
	561	24	"	3	1.00
Salt Lake City, Utah.	2,978	30	½-in. bars spaced 8 ins. apart	5 min.	3.805
	4,836	36		6 "	3.070
	5,521	40		7 "	3.150
Knoxville, Tenn.	4,000	36	Yes	4	2.50
Billings, Mont.	3,500	8 ft.	"	6 to 18	‡19.00
Watertown, N. Y.	2,800	36	R.C.P.Co.'s pipe	..	8.33
	2,600	33	"	..	5.39
	1,760	30	" "	..	3.65
	2,264	27	" "	..	2.56
	2,800	36	Parmley block	..	8.09
	2,600	33	" "	..	5.20
	1,760	30	" "	..	3.60
	2,264	27	" "	..	2.53
	2,800	36	Yes	..	8.58
	2,600	33	"	..	5.64
	1,760	30	"	..	3.90
	2,264	27	"	..	2.82
Bay City, Mich.	2,280	30	.....	4	.80
	7,017	36	.....	4	.85
Chillicothe, O.	940	30	By wire	2½	**1.60
	1,900	24	" "	2	**1.00
Coldwater, Mich.	1,588	42	.....	6	‡3.00
	955	36	.....	6	‡3.18
	836	24	.....	..	‡2.10
Jackson, Mich.	13,824	48	Steel rods	5	**3.00
Paris, Ill.	3' l'gths.	20	No. 10 expanded metal	1.8	.55
	.....	24	.....	2 1-6	.80
	.....	27	.....	2.4	1.00
	.....	30	.....	2.7	1.45
	.....	36	.....	3.25	1.90
	.....	42	.....	3.8	1.50
	.....	44	.....	4	2.70
	.....	48	.....	4.33	3.60
Dayton, O.	1,250	60	Yes	8	2.50
	1,140	54	"	7	1.98
	1,210	48	"	6	1.53
Iowa City, Ia.	1,400	18	No.	..	‡.76
Aberdeen, S. D.	800	24	"	2½	**.80
	1,600	36	Yes	4	**1.75

*Pipe only; made by city.
†Mixed—1 cement : 3 sand. Price of pipe at works.
‡Including excavation.
**Excluding excavation and laying.

NEWS OF THE MUNICIPALITIES

Current Subjects of General Interest Under Consideration by City Councils and Department Heads—Streets, Water Works, Lighting and Sanitary Matters—Police and Fire Items—Government and Finance

ROADS AND PAVEMENTS

Texas Has New State Road Law

Austin, Tex.—A new road law has been passed, under which it is believed a large amount of road improvements will be made. Any county is authorized to issue bonds or otherwise lend its credit to the extent of one-fourth of the assessed value of the real estate of the county for the purpose of constructing, maintaining and operating macadamized, graveled or paved roads. Upon the petition of 50 or a majority of resident property taxpaying voters to the court of the county the County Commissioners shall call an election to decide on the question of issuing bonds for road improvement. A two-thirds majority is necessary to carry the election. A smaller division than a county may take advantage of the act. The County Commissioner in whose district the law is applied is to be the superintendent of the district, with authority to make contracts, subject to the approval of the Commissioners' Court. T. W. Larson, secretary of the Beaumont Chamber of Commerce, is largely responsible for the passage of the law.

Mount Sterling Oils Business Streets

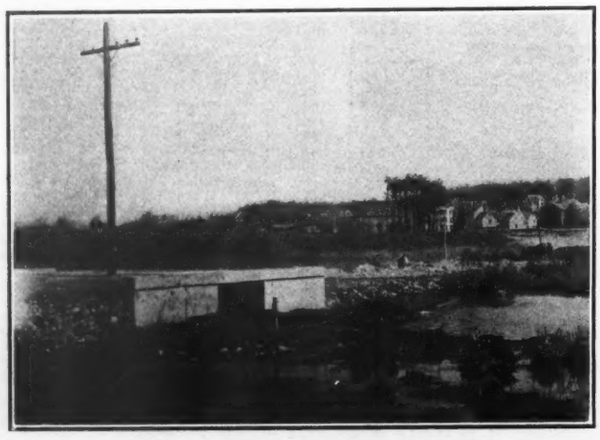
Mount Sterling, Ky.—The streets in the business district and in some of the residence sections of Mount Sterling have been thoroughly saturated with oil from the Ragland fields, 9,000 gallons being used. While it has deeply offended some of the housewives, who declare carpets have been ruined, it has been of great benefit to the stores and merchants. Oil will be put on the streets twice more during the year. The oil for the streets cost 3 cents per gallon, the expense being borne by the City Council and the property owners together. The work was done by Randall S. Stokeley, manager of the Standard Oil plant in Mount Sterling, an oil sprinkler owned by Lexington parties being used for the purpose.

Will Pay Royalty on Bitulithic

Los Angeles, Cal.—An agreement has been made with the Warren Brothers Company by which the city will lay bitulithic pavement on Sunset boulevard and pay a royalty of 25 cents per square yard.

Street Extended at Small Cost

Lynn, Mass.—Broadway place has been extended in such a way as to be a great convenience to many people at an expense of $500, thanks to the cooperation of the Board of Health and the Board of Public Works. Since last December ashes have been dumped in the low ground through which the extension runs, and direct access is now afforded to the center of the city to those who formerly had to come by a horseshoe route.



HOW LYNN, MASS., EXTENDED A STREET
Courtesy of the Lynn Item.

Parking of Motor Cars

Washington, D. C.—District Commissioner Macfarland is in favor of the plan suggested by automobile owners, who have offices in the vicinity of Fourteenth and G streets, of setting aside some public space as an automobile stand for the private machines. The formal request has not yet reached the Commissioners, but it is expected to be brought up at an early meeting of the Washington Automobile Club. The automobile owners who have offices in the large buildings in the vicinity of Fourteenth and G streets are in the habit of parking their machines along G and Fourteenth streets. They are often so close together that persons cannot pass between them, and storekeepers have complained to the police that the machines are obstructions to persons who want to drive up in front of their places of business. It has been suggested that part of the large open space at Thirteenth and H streets and New York avenue be set aside for the private motors, and that a telephone booth be put in the center, so that the owners of the machines could call for them when ready to use them.

Opening Streets Takes Time

Baltimore, Md.—Commissioner of Street Openings Atwood has made up the following time-table, showing the time consumed in the various formalities for opening streets:

1.	Preliminary. Filing of plat and publication of notice, Charter Section 828	42 days.
2.	Council. Introduction and passage of ordinance, average time	150 days.
3.	Commissioners. Notice of intention to proceed under ordinance, Sections 175, 829	30 days.
4.	City Surveyor. Preparing plats, average time	90 days.
5.	City Solicitor. Preparing abstracts, average time	270 days.
6.	Commissioners. Estimating assessments, sending notices, etc. Sections 175, 177, 178	30 days.
7.	Commissioners. Notice that statement and maps are open for inspection. Section 177	4 days.
8.	Commissioners. Review. Section 177	10 days.
9.	Commissioners. Average time making up and sending final return to City Register. Sections 177, 192.	10 days.
10.	City Register. Held for appeal to City Court and return to City Collector. Sections 177, 179, 181	45 days.
11.	City Collector. For collection of benefits. Sec. 181	70 days.
	Total time	751 days.

When it comes to the actual physical opening there is no limit. Some streets opened 15 years ago still have no thoroughfare.

Want Streets Oiled, but Oiled Right

Warwick, R. I.—The dust problem is under consideration. It is not believed that the property owners, merchants and others will be willing to pay to keep watering carts on the roads every dry day; hence, it is oil or nothing. Citizens will insist this year that the oiling be done in the best way. Last year the Jericho and Riverpoint roads were deluged with ill-smelling liquid, and there was just cause for complaint. It was demonstrated, however, at Coweset and in other parts of Warwick that frequent sprinklings until the oil and dust have become thoroughly mixed is the only effective and inoffensive method of using oil as a dust layer.

Street Paving Stops in South Bend

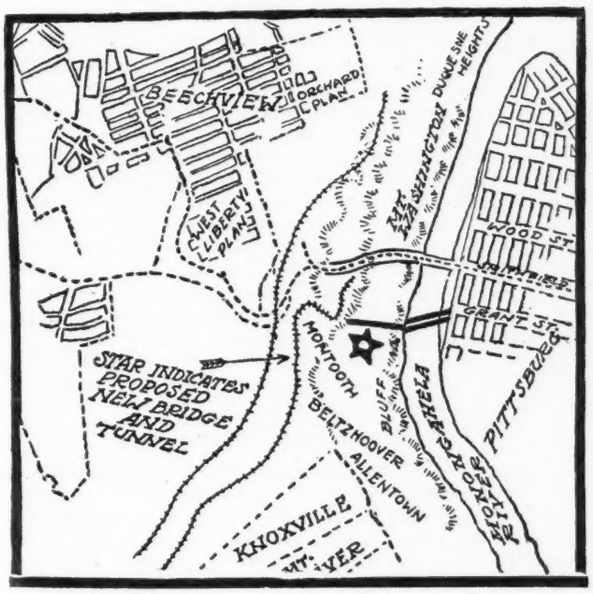
South Bend, Ind.—All street paving in South Bend will be held up for at least three months, according to City Engineer Alonzo J. Hammond. He states the new street improvement law governing cities of the first, second and third classes has raised a question which can only be settled in court. The law specifies that "foundations best suitable for wearing service for any kind of modern street pavements must be used." Contractors have interpreted the law to mean that the foundation giving best "wearing service" is concrete, and contractors insist that concrete foundations must be used, and asphalt companies have so notified cities, several notices having been received by City Engineer Hammond. It is this clause of the new law which has brought street paving in South Bend to a standstill.

IMPROVING THOROUGHFARES IN PITTSBURG

New Mayor Plans to Regrade Principal Streets as a Relief to Traffic—Bridge and Tunnel Projected

Pittsburg, Pa.—Mayor W. A. Magee will soon submit to Pittsburgers a practical method for removing the "Hump," the city's chief physical deformity, impediment to uptown commercial interests and the principal cause for congestion of traffic on the downtown streets. Plans and tracings designating all the buildings on Fifth avenue and other thoroughfares that would be affected by the removal of the big hill will be made. On the completion of the plans Mayor Magee will be prepared and willing to formally take up the proposition to cut the "Hump" with the abutting property holders and Conucils. The Mayor is of the opinion that the "Hump" has retarded the city's progress more than any other single cause and that building operations will remain at a standstill in certain sections until that part of Fifth avenue from Smithfield street to Sixth avenue has been graded to reasonably conform with the level of the thoroughfare below Smithfield street.

A bill has recently been passed by the Legislature providing for a bridge to connect with the city's business district at about the junction of Forbes street and Sixth avenue, just above the Try street yards of the Panhandle—this structure to connect with a new tunnel, wide enough for wagon traffic and footways, and possibly for trolley tracks in addition, which would enter Mount Washington at a point near the South School, on the Brownsville road, at a little higher elevation than the present Mount Washington trolley tunnel. The bill provides that the Commission-



PITTSBURG'S PROPOSED NEW OUTLET FOR TRAFFIC

ers may contract with any traction interests, giving them a 20-year franchise for the use of a part of the bridge and tunnel, so long as the tracks to be laid under such franchise do not interfere with pedestrian and vehicle traffic. In other words, the plan is to make both the span and tube wide enough to accommodate one pair of tracks in addition to the provision for the public. The projected tunnel would furnish an outlet for 100,000 people who live on the southern slope of the hilltops and in the growing suburbs beyond. At present vehicles and pedestrians are compelled to climb the almost inaccessible hills in getting to and from the city proper, or else use the inclines—where the charge is 20 cents per round trip for a single horse.

Muskogee Has Asphalt Testing Laboratory

Muskogee, Okla.—For the purpose of testing asphalt and ascertaining whether the material being placed on the various streets by contractors is fully up to the standards specified in the contracts awarded, a chemical laboratory has just been completed under the supervision of City Engineer Kinsey, and hereafter asphalt testing will be done in Muskogee.

SEWERAGE AND SANITATION

Hokey-Pokey Men Must Go

Columbus, O.—The Board of Health has started a war on the hokey-pokey man, and his days are numbered. A special ordinance to put them out of business will be drawn up at once. It is claimed that they leave their cans open, dust settles on the cream, and it is made unfit for use. The same rule, it is claimed, applies to salted peanuts, and they may also come under the rule. The ordinance will require all cream to be sold in closed rooms, free from dirt and dust and means that the red wagons, push-carts, etc., that have been the delight of the newsboy, the schoolboy and all other children who saved up their pennies waiting for the hokey-pokey man will soon be compelled to find some other place to spend them.

Strict Health Rules for Railroads

Helena, Mont.—The State Board of Health has issued a new set of rules and regulations for sanitation and ventilation purposes, applicable on all railroads operating within the State, effective June 1, and which is said to be the most stringent on record. They provide for the removal of passengers afflicted with communicable diseases and at the same time prohibit porters from using bedding provided for passengers or from sleeping in sleeping cars unless separate compartments are provided. There are strict regulations as to the cleaning of trains and the furnishing of cuspidors for all cars. Sleepers must be fumigated at least every two months, while only pure water and ice may be legally used in coaches, sleepers and diners. Similar rules apply to passenger stations. There are many other health conditions for the traveling public.

New Sanitary Law in Indianapolis

Indianapolis, Ind.—Property owners living in the vicinity of Fall Creek have formed an organization and appointed a committee to employ attorneys to advise what action should be taken under the new stream purification law to prevent the pollution of that creek. The first step taken will be to enjoin the construction of the Brightwood sewer, about half of which has already been built. This, however, is only a small beginning toward purifying the stream, as there are 14 other sewers now emptying into Fall Creek. In addition to fearing that sanitary sewage emptied into the stream will injure the boulevard system built and proposed, people living in the vicinity of Fall Creek say it is absurd for the city to proceed with a sewer to cost $180,000, emptying into Fall Creek, when within a short time the city will be compelled to change its entire sewerage system when it installs a purification plant.

Street Soda Fountains Watched

Hartford, Conn.—The Street Board has ordered street soda fountains and ice cream stands to be kept back of the street line. The Health Board has authorized its superintendent and food inspector to compel all proprietors of such stands to have their booths connected with running water. Dr. Arthur J. Wolff said there was no question that the cheap syrups used at these stands contain unwholesome ingredients, and the practice of conducting them without running water for washing the glasses is unsanitary.

An Unenviable Distinction

Lake Charles, La.—Lake Charles, a city of about 10,000 inhabitants, is said to be the largest city in the United States having no sewerage system. A few sewers put in by private parties drain into the Lake. Alderman Smith has tried to secure the passage of an ordinance creating a sewerage district and providing for a bond election, but the ordinance has failed to pass.

Federal Aid Asked in Purifying Lake Water

Lockport, N. Y.—The Niagara County Supervisors at a meeting passed resolutions stating that in their opinion the purification of the waters of the Great Lakes could only be brought about by action of the Federal Government. The resolution advocates the passage of Mr. Simmons' bill, House Resolution No. 5,695, providing for Federal investigation and action.

5

WATER SUPPLY

Boston Water Pure, Though Colored

Boston, Mass.—Complaints of the color and odor of Boston water have caused an investigation by the Water Department, with the result that Commissioner Hannan declares that he has been assured by the Metropolitan Water Board that there was nothing unhealthful in the city's supply of water. The Metropolitan Water Board experts say that the unusual color and smell are due to a considerable body of asterionella, which grow in larger numbers from the first of March to the middle of May.

Finds a Great Water Waste

East Orange, N. J.—Out of a daily average of 2,527,000 gallons of water pumped into the mains of East Orange, 1,300,000 gallons are wasted through carelessness of consumers or defects in piping, according to a report made to the Water Committee by the Pitometer Company of New York, which has spent several months in a series of exhaustive tests of the mains from the pumping station at White Oak Ridge, Millburn, to and through the city. The report indicates that only a very small percentage of the loss occurs in the mains themselves, but it is at points beyond private connections. It more than confirms the statements made by Engineer Arthur A. Reimer, of the Water Department, who urged in his annual report that the city install meters for all private connections, and declared that the city was losing "at least 1,000,000 gallons daily." The actual findings of these tests made by the company which did the work show a total daily loss of 1,620,000 gallons, or 64 per cent of the entire flow, based on the water that passes through the mains between the hours of midnight and 5 a. m., but the Engineer has allowed an average off that of about 300,000 gallons for legitimate night uses, which would bring the loss to the round figure named of 1,300,000 gallons.

River Water Is Mixed With Artesian Supply

Fort Worth, Tex.—After inspecting the city water works Mayor William D. Williams, newly installed, who has since resigned, issued the following statement:

Having been over the city water plant and having made as thorough an inspection as circumstances permitted, I find that the city is now and for a year or more in the past, has been furnishing to its patrons water from mixed rivers and artesian sources. I feel it my duty to give notice of this so that all consumers may adopt such methods of protection as they think proper.

As the condition has been practically permanent for the last twelve months and as I am not myself certain within what time it can be remedied, I wish this to be taken as a continuing notice and will call attention publicly to any change which may occur. Citizens may rely upon it that the city government will give its best efforts toward procuring an adequate and unpolluted supply.

New Jersey Governor Urges State Park and Reservoir

Montclair, N. J.—Governor Fort, addressing the Montclair Civic Association at Montclair on the water supply, said the State ought to acquire about 100,000 acres in the northern part of the State owned by the Harriman, Hewitt and Hamilton estates, lay out a magnificent park and build a reservoir to supply all the larger cities of the State. The Governor said E. H. Harriman, who owns about 45,000 acres of the land, had promised to give 23,000 acres of his land provided the State got possession of the rest of the tract. Mr. Harriman had remarked, the Governor said, that the tract was "only 25 cents from New York."

Veteran Mayor Favors Municipal Water Works

Stillwater, Minn.—Mayor J. G. Armson, who has served as Mayor for 10 years, has resigned to accept the position of State Tax Commissioner. In his last message to Council he recommends that the city should purchase or build a water works system when the present franchise expires, in about a year. He says that in the last year the city has paid $112,850 for hydrants. By comparison of 25 cities as large or larger than Stillwater he figures that taking Stillwater's payments as 100 per cent, cities owning their own works pay 66 per cent, and other cities served by private companies pay 86 per cent.

STREET LIGHTING AND POWER

Six-Cent Rate Recommended

Columbus, O.—The Council committee which has had under consideration the fixing of rates for electricity has recommended the rate of 7.5 cents per kilowatt hour as the maximum charge. This rate will be subject to a discount of 20 per cent if paid promptly, making it practically a flat 6-cent rate, which is 1 cent less than that charged by the Columbus Railway and Light Company. Whether this rate will be accepted by the company remains to be seen.

Cheap Gas for Indianapolis

Indianapolis, Ind.—After years of ceaseless war on the local gas company, this city is realizing its dream of 60-cent gas, and there are indications that this, if not a lower figure, will be the price for years to come. A new gas company, backed by ample capital and with all classes of citizens as stockholders, has begun to serve gas at 60 cents per 1,000 cubic feet, and the old gas company, which has been charging 90 cents, is preparing to meet the competition, and will have to do so after July 5 or take its mains from the city streets. Ten years ago people here were paying $1.25 per 1,000 cubic feet for gas, and the company was claiming an unlimited franchise, without any restrictions as to the price it might charge. After much negotiation it waived its claim of perpetual franchise, and accepted a charter for 10 years, the price of gas to be $1 a thousand till the annual consumption of gas reached 300,000,000 cubic feet, 95 cents till it reached 350,000,000, and 90 cents after that figure was passed.

Lights for All the Highways

Los Angeles, Cal.—In addition to being the first in the State to vote an immense bond issue, $3,500,000, for making good roads, Los Angeles County will probably take the lead of the country in lighting its principal highways at night, using electricity. The first step toward this innovation was taken when the Board of Supervisors asked the District Attorney for a legal opinion regarding the method of procedure. The subject was subjected to the county authorities by petitions from several of the smaller cities for partial maintenance of the lamps on the boundaries which reach outside territory. Along the main thoroughfare are many unincorporated settlements and a large population, and one of the Supervisors expressed himself as favoring illumination for all these people, as well as those on the edges of cities, and the sentiment seems to meet with approval. It will be a costly proposition and carried out gradually if decided upon.

Wants Municipal Lighting Plant

Orange, N. J.—City Engineer Fred. T. Crane has submitted estimates on the cost of installing and operating a municipal lighting plant based on bids received two years ago with an allowance for the reduction in the cost of materials since that time. As compared with the current rate of $85 an arc light, he estimates an annual saving of $7,262. As a greater number of lights are needed, and will soon have to be installed, the total gross saving would be greater—$15,700 if 100 new arcs are put in. By a greater capital outlay than contemplated heretofore a still greater saving could be made on account of the increased efficiency of more expensive machinery. The City Engineer points out that there is sufficient space for the lighting plant at the new Chestnut street pumping station. The proposed plant would include machines for 350 7½-ampere alternating current arc lights.

Washington Gas Cut to Ninety Cents

Washington, D. C.—Patrons of the Washington Gas Company after the first of next July will pay 10 per cent less for gas used than they are doing at the present time. At a meeting of the board of directors of the company it was decided that after that date the price charged for gas will be 90 cents instead of $1. It was explained by a director after the meeting that this action was voluntarily taken by the board because both the Senate and the House Committees at the last session of Congress expressed a desire to have the price reduced, and the company recognized that the time had come when it could be and ought to be done with fairness to all.

FIRE AND POLICE

Columbus to Have Fly Cop

Columbus, O.—Fly Inspector is the technical name of the new inspector that will be asked for of the City Council by the Board of Health during the next few weeks. An effort will be made this summer to make Columbus a city without flies. Of course, the Health Department does not expect to accomplish it the first year of the new work, but they expect to make such headway that within another year they will have reached such a degree of perfection that other cities of the country will begin to sit up and take notice of the way they are doing things here. It is claimed that flies can be entirely exterminated if the proper precautions are taken, and it is for the fulfillment of these precautions that another inspector will be asked, whose duty it will be to enforce some of the rules of the Health Department that have gone by default in the past.

Policemen Specialize as Motor Cyclists

Cortland, N. Y.—The Police Department has purchased a motor cycle and each policeman is learning to do a trick on the wheel.

Living Wheel in New York Police Parade

New York, N. Y.—Something novel in the way of a drill will mark the police parade on May 8. Each year, for the last three years, the provisional battalion, made up of probationary men, has done something new when lined up before the grandstand. This year the battalion will execute a movement that is bound to elicit applause. The movement complete will form the men into a perfect wheel with five spokes, as shown in the illustration. In the center will be the flag carried by the battalion. Eight men, in single file, will form each spoke. Two men abreast will make up the outer rim of the wheel. At a word of command from Captain Brown this wheel will revolve rapidly, then disintegrate and then reform. The maneuver is the idea of the Chief Inspector, and the drills have been carefully and steadily conducted under the eye of Captain Brown, the drill master.

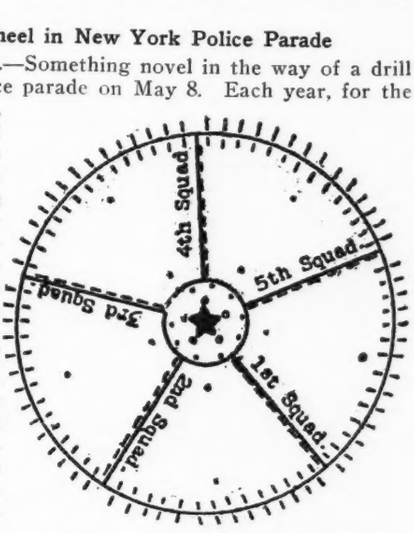


DIAGRAM OF NEW POLICE MANŒUVER

Police Stations Termed Models

Rochester, N. Y.—Dr. Charles F. Howard, of Buffalo, President of the State Commission on Prisons, who has inspected the headquarters and stations of Rochester, was much pleased at the conditions found and complimented the police officials highly. He expressed the hope that Rochester would soon have a night court. In Buffalo, he said, court was held at 5 o'clock in the morning, so as to give a discharged prisoner an opportunity to return to his employment at the regular hour.

Police Must Spruce Up

Washington, D. C.—Major Richard Sylvester, Superintendent of Police, has issued an order to the members of the Department calling their attention to the untidy appearance of the uniforms of some of the policemen. He says:

There is nothing which creates more unfavorable comment and adverse criticism on the part of citizens and strangers than to observe the guardian of the peace in slovenly attire; greasy coat collars and cuffs, unremoved stains, threads dangling from worn-out buttonholes, buttons off, badges unclean, shoes unshined, caps or helmets placed on the back or side of the head, are conditions that must be corrected.

It is stated in the order that inclement weather conditions, fire and emergency work will be accepted as the only excuses for failure to comply with the provisions of the manual respecting the appearance of members of the force.

WATER GUN TO STOP SCORCHING

Novel Plan Adopted by Police of One City to Stop Practice—Speed Law Amended—Motor Apparatus Installed

Hammond, Ind.—A new plan has been devised to stop auto scorching. A water gun in charge of an operator with telephone connections will be installed on the highway. When notified by the police of the approach of a speed violator the operator will be prepared to order him to stop or enforce the order with the water gun.

Philadelphia, Pa.—With the cooperation of Councils in providing the necessary funds, Director of Public Safety Clay hopes to substitute a modern automobile police patrol wagon system for the present horse patrol service before his term of office expires. He believes the city will save about $25,000 a year by the change on account of the lessened cost of maintenance.

Butte, Mont.—City Council will amend the speed ordinance so as to allow the Burglar Alarm Company, a local concern, to run its automobile at a higher speed than that prescribed in the city ordinance.

Newark, N. J.—The new auto ambulance for the City Hospital has been put in commission. It is a big four-cylinder car, capable of making 40 miles an hour.

Davenport, Ia.—A new auto patrol built at the Meteor shops has been put in service. The car is a 50-horsepower machine, with a black body and black top, much like the old wagons. It will carry 12 men and can make 60 miles an hour.

Westfield, Mass.—A Pope-Hartford combination chemical and hose wagon has been ordered at a cost of $3,500. It will carry a 40-gallon chemical tank, 250 feet of chemical hose and 1,000 feet of water hose. The motor will be 40-horsepower. The machine will weigh 6,000 pounds. All parts of the machine are specially made for it, being heavier than the ordinary automobile parts.

Extension Ladder Broke

Troy, N. Y.—F. S. Seagraves, of Detroit, Mich., representing the Seagraves Truck Company, arrived in this city for the purpose of making an investigation of the ladder which was used and collapsed at the fire on Congress street early on the morning of April 6, resulting in the death of Dr. Harry O. Fairweather, a member of the Read Steamer Company. Mr. Seagraves is the founder of the concern ,and will submit a report of his findings to the executive officers of the corporation. He called at the Department of Public Safety headquarters and held conference with Commissioner Mann and Deputy Commissioner McKean. He made a thorough examination of the broken 30-foot ladder, and made some comments on the statements made that the wood used in the construction of the apparatus was "punky." Mr. Seagraves stated that during the 18 years of existence of the company no record was known of a like accident. The ladder, he stated, was made of the best wood, genuine fir lumber, which cost $200 per 1,000 feet. "There was no punky wood used in building that ladder or any other piece of apparatus turned from the Seagraves factory, and a good judge of material will corroborate my statement." The only explanation given by the inspector as to the cause for the sudden collapse of the structure was the sudden jumping of the hose when the water was turned on, and he called attention to the ladder breaking at a point where it had been previously repaired, showing faulty work.

Office of Inspector of Fire Hydrants Created

Bridgeport, Conn.—An ordinance has been passed authorizing the Board of Fire Commissioners to appoint from among the members of the Fire Department an inspector of hydrants, whose duty it is to keep all hydrants flushed, oiled, packed and painted, and at all times in condition for immediate uses, to keep all fire alarm boxes painted, and to perform such other duties as may be required by the Board of Fire Commissioners under the direction of the Chief Engineer. The inspector will be paid $1,200 per year.

Fixes Prices for Outside Service

Wilkes-Barre, Pa.—Prices have been fixed for emergency calls to outside towns. The Fire Committee has decided to charge at the rate of 75 cents per hour per man and $25 for apparatus for the first hour and $15 per hour thereafter.

GOVERNMENT AND FINANCE

Gas Company Must Pay for Privileges

Altoona, Pa.—No more corporations will be given free franchises to do business in Altoona, judging from the action of Councilmen at the meeting of the Committee on Public Works. The ordinance granting a charter to the Altoona Gas and Fuel Company was laid before the body, and when it was shown that a similar concern in Johnstown had been required to pay $10,000 for its privileges and $1,000 a year thereafter, it was decided to hold the ordinance over for further investigation and consideration. A committee of five, composed of Chairman Shelly, Shute, Lynch, Loudon and Mitchell, was appointed to amend and draw up a substitute ordinance to be presented to Conucils.

Anti-Hog Ticket Wins

Obion, Tenn.—Considerable interest was manifested in an election held here for the purpose of selecting a Mayor and three Aldermen. There were two tickets in the field, and the main issue was whether or not hogs should run at large on the streets. The anti-hog ticket was headed by A. Wilson, the present Mayor, who was re-elected.

Legislative Committee Commends Commission Government

Springfield, Ill.—The Senate sub-committee of five members of the Committee on Municipalities, who went to Texas to look into the Commission plan of city government, made its report. "In every city we visited we found the almost unanimous sentiment of the citizens favoring the Commission form of government. The enthusiasm for it is hardly describable. Extremists have gone so far as to favor the abolition of the Legislature of Texas and substitute therefor a Commission of five to govern the State of Texas. Without doubt, there has been a marked improvement in the conduct of the affairs of these cities under this plan of municipal government. Able, fearless, progressive and conscientious men are in charge of public affairs in these cities. Under the stimulus of great municipal improvements, conducted in the same manner as the affairs of great private enterprises, these cities are entering upon an era of great prosperity, with full confidence of their citizens in the integrity of their public officials and in the efficacy of the Commission form of government."

Saves Money by Paying Higher Interest

Tacoma, Wash.—Following the statement in the Council by Councilman S. R. Wilkeson, chairman of the Finance Committee, that the city is wantonly throwing away money to issue special water warrants drawing 6 per cent interest when general bonds could be floated at 4½ per cent, City Treasurer Ray Freeland has figured it out that the city will really save nearly $50,000 by issuing the 6 per cent warrants instead of the 4½ per cent bonds. "The reason of this," said Mr. Freeland, "is because of the clause in the ordinance providing for the warrants which requires that a certain number of them be retired each year, beginning with January 1, 1910. The ordinance provides that from January next until July 1, 1919, the city must retire 11 warrants every six months. From January 1, 1920, until July 1, 1928, the city must retire 12 warrants each six months, and 16 warrants from January 1, 1929, to and including July 1, 1930. As a result, the interest payment is constantly decreasing until it finally dwindles down to $240, when the last warrants are canceled. The total amount of interest paid out by the city from the time the warrants are issued until the last one is canceled will be $176,610, figuring the interest at 6 per cent per annum, as provided in the advertisement for the sale of the warrants. Against this amount the interest paid out on 20-year bonds, and all of our bonds are issued for 20-year periods, none of the general bonds being retired every six months, as these warrants will be, 4½ per cent per annum amounts to $225,000. This leaves a $48,490 saving that will be made by the city in using the warrant system instead of the bonds."

To Assess Land and Improvements Separately

Philadelphia, Pa.—In a memorial to Select and Common Councils the Tax Reform Association of Pennsylvania submitted a plan for changing the method of assessing property. The proposed system requires that the Assessors shall value separately the land and the improvements, and provides for giving full publicity to all the details relating to each property or lot assessed.

CITY HAS FIVE MAYORS

Ohio Municipality Well Supplied with Executives, but Courts Must Settle Which Is Chief—Illinois City Has Dual Head

Fostoria, O.—Carl C. Anderson, who was elected to Congress from the Thirteenth District, maintains he is still Mayor of Fostoria. Four others claim to be Mayor. They are Frank Gebhert, against whom Anderson has instituted proceedings in quo warranto and is actually on the job, occupying the Mayor's office and signing all municipal papers, J. Ross Braford, appointed Acting Mayor when Anderson went to Washington in December; Justice Clyde J. Johnston, appointed as Mayor in Police Court cases for fear the others might be held as illegally holding office by the courts, and Justice J. R. Knowles, who claims none of the others has jurisdiction over his ward, which lies in another county, and who asserts he is thus Mayor of at least a part of the city. Meanwhile, Fostoria has gained the reputation of being the most governed city in America.

Ben Bow, Ill.—In a typical Venezuelan revolution the government of Ben Bow City has been snatched from A. E. Ben Bow, its founder and President. The enemy is entrenched inside the City Hall and violence will follow any attempt of the deposed President to gain control, according to a manifesto issued. Ben Bow is to the village what Castro is to Venezuela, except that he has control of the city treasury. The Illinois Legislature recently passed a law by which villages of a certain class shall elect officers on the odd year. Mayor Ben Bow was elected prior to that law for a term of two years, and when the opponents called an election this year the Mayor declared it illegal and refused to give up when he was beaten. Out of a male population of 500 Ben Bow City has 24 voting citizens, the remainder being foreigners. Sixteen of these 24 voted against Mayor Ben Bow. The Mayor seized the ballots and refused to let go his hold on the executive office. The present condition of affairs arises from this.

REFUSE COLLECTION AND DISPOSAL

Camera Useful to Sanitary Inspector

Duluth, Minn.—The first conviction obtained under the new sanitary ordinance was secured through the evidence of Health Inspector Carhart and his camera. In making his rounds the Inspector came across a huge pile of refuse in a backyard. Although it was raining, a good photograph was obtained, with the result that the offender was fined $10 and costs.

Sprinkle Macadam Streets with Oil

St. Paul, Minn.—The substitution of oil for water for the sprinkling of macadamized streets has been provided for by the Board of Aldermen, which allows City Engineer L. W. Rundlett to make this change if it is found expedient and is petitioned for by the residents of a given street. The expense of sprinkling will be accommodated under the new scheme of assessing property holders directly for such service.

For Cleaner and Better City

Washington, D. C.—Police regulations are not to be a dead letter in Washington. Stricter enforcement, recently inaugurated, will be maintained. For dropping refuse from wagons on the streets, for driving on the wrong side of the street, for failure to attach a weight to horses left standing and for violations of other regulations relating to vehicles many arrests of drivers have been made, and fines of from $2 to $5 were imposed upon conviction on these charges. It has been pointed out to the police that it is practically impossible for drivers of milk and bread wagons in the early morning to comply with the regulation requiring that standing horses be weighted or that some persons be left in charge. One express company has also complained to the police against enforcement of the regulation. A representative of the express company called at police headquarters and made inquiries about the continued enforcement of the law. Horses drawing heavy express wagons, he said, are not likely to run away, being only too glad to have an opportunity to rest. He was told that the police will continue to enforce the law.

RUBBISH CAN OF DENVER

Useful Appliance Devised by Highway Commissioner of City—Sack Hangs Within Under Locked Top—Sanitary Arrangement

Denver, Col.—Denver uses a rubbish can, the invention of its Highway Commissioner, Sam Phillips. The can itself is a very simple affair, and stands 36 inches high, with sides of 19 inches each. The height makes it easy for foot passengers to drop in their waste as they pass. Adjustable feet are under each corner so the can, which is designed to be attached to a street post, may be permitted to adjust itself to the pitch of that post or to the slant of the walk; thus it may be kept always in a primly upright position. Within the can is a large sack, fastened to hooks on the top, but swinging clear of the walk. This sack is hung on hooks directly under the removable top, so arranged that when the top is down and locked the sack cannot be removed. The movable top is really a hopper through which the waste passes to the receptacle sack within. The sack can be removed only when the hopper-top is unlocked and put to one side. This is to prevent any but those authorized from removing the sacks or any considerable part of the contents. Of course, as the hopper is kept open to facilitate the depositing of rubbish, it is within the possibilities that the curious may inspect the contents, or a part of them. The sanitary idea is carried out by having perforations in the bottom of the sack to permit the escape of moisture, and this, together with the arrangement for the free circulation of air through the can, which has an open bottom, keeps the contents as near dry as possible. An objection urged that the waste being very inflammable, danger would be incurred because of the throwing of cigars and cigarette stubs in among the rubbish, has not been upheld by experience. But once has this happened in Denver, and even then the presence of the can was an added safety, for it kept the fire within bounds, so that no damage resulted to anything but the contents of the can and the pouch.

DENVER REFUSE CAN

City Streets to Be Washed Often

Seattle, Wash.—Never in the history of Greater Seattle have the arrangements for caring for paved and unpaved streets been so extensive as this year. Two electric sprinkling cars, delivered early last year, and not used because of the scarcity of water, will be put into commission, under a contract with the Seattle Electric Company, and have a capacity of 4,000 gallons each. In Lake Union district unpaved streets will be flooded between 1 and 5 a. m., and in the Queen Anne district the flooding will begin at 8 o'clock in the evening. In order that the unpaved streets on which cars are operated may be kept in condition during the day an additional number of sprinkling wagons will be put in service and run over the same streets during the day that the electric cars serve during the night. Five additional flushing machines will be ready for service May 1, making eight in all, and the night force will be increased from 13 to 25 men. "Every street leading to the exposition grounds will be washed every night in the week," said M. T. Maloney, Superintendent of Streets, "and our plans are such that the streets in every section will be kept in the best condition possible. There will be more washing and less sweeping, owing to the dust, and but two sweepers have been added to the equipment, making four in all."

White Suits for Racine Street Cleaners

Racine, Wis.—All street cleaners have been provided with white suits. This action was taken by the Board of Public Works, in the belief that the service will be improved if the men are properly uniformed.

Want Clean Streets

Wilkes-Barre, Pa.—Cleaner streets, a much desired acquisition in this city, is the goal at which the special street cleaning committee of City Councils is aiming. A special circular has been prepared for distribution among the merchants and other residents of the city entitled, "For Cleaner Streets." As a preface the populace is informed that the special street committee has notified Chief of Police Long to strictly enforce the city ordinance relating to the littering of the streets with rubbish and other material. The text of the State law governing this matter which was approved by Governor Pennypacker in 1905 and of the city ordinances relating to the matter are included in full. They relate particularly to the throwing of waste paper in the streets and the sweeping of dirt from stores and other places.

RAPID TRANSIT

Subway Bonds Excluded from Debt Limit

Albany, N. Y.—By the decisive vote of 126 ayes to 13 noes the Assembly passed the Travis-Lee constitutional amendment to eliminate self-sustaining subway and stock bonds of first-class cities and water bonds of third-class cities from the computation of the debt limit. This constitutional amendment, which has now been approved by the Legislature for two successive years, will come up before the people of the State for a vote next fall, and if adopted will permit New York City to expend a large sum, estimated all the way from $50,000,000 to $150,000,000, for subways.

Quaker Traction Wins

Philadelphia, Pa.—The Supreme Court has affirmed the decision of the Court of Common Pleas of Philadelphia, sustaining the right of the Philadelphia Rapid Transit Company to charge a straight 5-cent fare when transfers are issued.

Sweeping Fender Order Issued

New York, N. Y.—Better to safeguard human life, and, if possible, to reduce the number of fatal accidents on the street car lines, the Public Service Commission has issued orders to all street railroad companies in Manhattan, Brooklyn, the Bronx, Queens and Richmond to equip all their cars, except those operated by animal power, with wheel guards or fenders of a type to be approved by the Commission. The Manhattan and Bronx companies must install wheel guards on all their cars by August 1 and submit by May 15 drawings and specifications of the device to be used. The Brooklyn and Queens companies are required to equip all their cars in service, except horse cars, with fenders of a type approved by the Commission by July 1 and to submit drawings to the Commission by May 15. This action was taken in accordance with the recommendations of a report made by Commissioner Milo R. Maltbie, an abstract of which, with illustrations, was given in the MUNICIPAL JOURNAL AND ENGINEER February 10.

State Commission Recommends Improvements

Pittsburg, Pa.—The Pennsylvania State Railroad Commission has issued its report, made on the city's complaint, recommending the following improvements in the Pittsburg traction service:

First—Additional service is to be provided on certain routes as specified in detail.

The maximum number of cars on the most congested loop with this increased schedule would be one hundred and twenty (120) per hour. Car movements will necessarily have to be facilitated in every possible way to get satisfactory service from this headway, and the actual schedule of the different routes may have to be modified to properly take care of the increased number of cars; this, however, is an operating matter to be worked out by the traffic department of the company.

The above recommendation is made on the assumption that the company will use the same type of cars on the various routes as are now in use thereon, but wherever possible, the long, double-truck cars should be substituted for the smaller ones, and a still greater improvement in the service would thus be effected.

Second—That the company station inspectors at every important point and that, as far as practicable, the municipal authorities secure to these inspectors the authority to regulate the headways of cars on the various lines, to the end that a closer adherence to schedule may be maintained.

Third—That at all important junctions in the terminal district electrically operated switches be introduced, or that the switches now in place be operated by employes of the company other than those engaged in the operation of the cars.

Fourth—That the company endeavor to at once improve the lighting arrangements in the short cars, and give more careful attention to the heating and ventilation of all cars.

Fifth—That every legitimate effort should be made to secure the speedy abolition of all grade crossings of steam railroad lines.

MISCELLANEOUS

Cost of Duluth Ferry Bridge

Duluth, Minn.—City Comptroller McCormick has prepared a statement showing the exact cost of building, operating and repairing the aerial bridge. The original cost of the bridge, with approaches, was $108,740.34. The cost of maintenance and repairs for four years was $26,-168.25, and the interest on the bonds up to the first of January was $12,000. Free ferry service while the bridge was out of commission cost $12,208.80. The biggest year for maintenance and repairs was 1908, with $8,280.18. Free boat service will again be established when the bridge will stop running, in order that a platform may be built upon the upper framework from one side of the canal to the other.

Want No Posters on City Property

Franklin, Pa.—Council has passed a resolution requesting the Mayor to have signs and posters removed at once from city property. An ordinance was unanimously passed prohibiting such defacements in the future.

Civic Revival for Fort Wayne

Fort Wayne, Ind.—Fort Wayne is to have a civic revival with Prof. Charles Zeublin, of Chicago University, as the leader in the movement. He speaks first on June 2 and the following Sunday night. The purpose is to unify public sentiment so as to beautify the city by the improvement of the present parks, the purchase of new park plats and the parking of the river streams, as well as to provide playgrounds for the children. As one result of the recent Commercial Club banquet it is expected that the people will have an opportunity to vote on a proposition to subscribe $100,000 acquired by sale of bonds for these purposes. Instead of the city now being in debt beyond the constitutional limit, as was supposed, the growth of the city is shown by the new appraisement to have lifted the city to a new plane, where it can legally raise the money.

Pennsylvania Legislation Affecting Municipalities

Harrisburg, Pa.—Among the bills recently signed by Governor Stuart are the following: Authorizing the Department of Forestry to grow and distribute trees at cost. Authorizing first-class townships to pave and curb highways on petition of two-thirds of property owners. Permitting cities, boroughs and first-class townships to establish municipal forests. Requiring street railways to transport mails on demand.

St. Louis Wants 1,000,000 Population

St. Louis, Mo.—The Million Population Club has decided that the city's population can be increased by the expenditure of $100,000, and the Municipal Assembly will be asked to appropriate that sum. The scheme is for one-half of the amount to be spent with local newspapers, in monthly supplements, dealing with the advantages of St. Louis. The other half is to be spent for magazine and billboard advertising and circulars.

Mayor's Proposal for City Flag Is Pleasing

Portsmouth, Va.—Mayor Reed's proposal for the creation of a city flag, to bear a reproduction of the city seal—a full-rigged sailing ship—has met with approval in many quarters. The matter is now in the hands of the Public Property Committee of City Council, and the prospects are that the city will soon have an emblem.

First Aid Station in Park

Washington, D. C.—The establishment of a first-aid-to-the-injured station in the old Pierce Mill in Rock Creek Park is being considered by the District Commissioners. L. R. Grabill, Assistant Engineer in charge of Rock Creek Park, has suggested the project in an informal way, and Commissioner Macfarland favors it. The need for some such equipment in the park was strongly emphasized in connection with the serious accident to Lieutenant Semmes Read, the President's naval aid, several weeks ago. Although he had many bones broken and was severely injured internally, he had to be placed on an automobile seat, where it was impossible to straighten him out to make the injuries less painful, and carried several miles in that position to a hospital. Several other accidents have occurred in Rock Creek Park.

DOG NEWS OF THREE CITIES

Animals Not Muzzled to Be Shot as Result of Rabies Scares—Baltimore Puts Six Wagons in Service

Bloomington, Ind.—Mayor Malott has issued a proclamation ordering all unmuzzled dogs to be shot. This action followed the development of a case of rabies in a dog that bit two men and several dogs.

Norfolk, Va.—Police Chief Kizer will enforce the ordinance requiring all dogs to be muzzled. Dogs not muzzled will be shot if at large.

Baltimore, Md.—Six newly painted single-horse wagons, in which vagrant and incorrigible dogs are carted away to the pound, were recently received by Collector Clark of the Bureau of Water Rents and Licenses and Mayor Mahool. Each wagon is to operate in a separate district.

More Playgrounds for New York

New York, N. Y.—Demands have been made on the Board of Estimate in the past month or two by many civic organizations for the appropriation of money to turn into playgrounds vacant spaces owned by the city. The city has acquired by condemnation proceedings many parcels of land which are meant for public improvement, but are now lying idle because the municipality is unable to spend the money. It is proposed that these vacant spots, until they are required by the city, shall be given over to the children, particularly as under the will of Mrs. Betsy Head the city has $200,000 for the equipment of such playgrounds.

Municipal Ice Plant and Free Ice

Philadelphia, Pa.—Free ice, manufactured at an independent plant and delivered to poor families, was one of the plans proposed at a general conference held in the Mayor's reception room for the prupose of inaugurating a campaign to cut down the infant mortality in this city. The suggestion was advanced by Dr. A. C. Abbott, Chief of the Bureau of Health, after many experts from other cities had discussed the subject, and he declared that in view of the scarcity of the natural ice crop and the danger of the dealers in the manufactured product taking advantage of the conditions to boost prices, the best step to be taken would be to erect an independent plant and be prepared to meet this emergency. Following his address, Dr. Abbott declared that at the Philadelphia General Hospital the ice plant is of sufficient capacity to guarantee an extra output of 20 tons daily that could be distributed to the poor, and that at the new Municipal Hospital grounds there is another ice plant ready to be placed in operation at a moment's notice, so that there is no danger of the poor wanting for ice to properly protect the milk supply for babies, since Director Neff of the Department of Health and Charities is directing the movement to save the lives of babies in this city.

Village Has City Hall

Newark, N. Y.—The Village Board of Trustees has reconsidered its action in naming the municipal building "Village Hall" and has decided to have it known as "Newark City Hall."

Shade Tree Commission for City of Williamsport

Williamsport, Pa.—A joint resolution has been introduced in Councils which has for its object the regulation of planting and care of shade trees in Williamsport. The resolution recites that by reason of the indifference and irregular methods employed in the planting and care of shade trees along the highways of the city of Williamsport, it becomes necessary that some uniform plan be adopted, and it is therefore provided that the act of Assembly of May 31, 1907, be accepted to take effect after the first Monday of April, 1910. The act in question gives Councils authority to appoint a shade tree commission, whose duty it shall be to supervise the planting, removing, maintenance and care of trees. The expense of planting or removing trees by order of the commission is to be borne by the property owner, but the expense of caring for the trees is to be provided for by a general tax not exceeding one-tenth of one mill on the assessed valuation. By the terms of the resolution the Brandon Park Commission will be constituted a shade tree commission, with the like force and effect as if appointed under the provisions of the act.

LEGAL NEWS

A Summary and Notes of Recent Decisions—Rulings of Interest to Municipalities

Defective Street—Electric Pole Excavation

Central Union Telephone Co. vs. City of Conneaut.—Defendant company dug an electric pole hole in a street under an agreement with the city's Electric Lighting Superintendent to raise a pole herein to carry the city's electric light wires over defendant's telephone wires at an intersection. The city neglectd to put up the pole for three months, during which time the Lighting Superintendent made temporary provision for the wires, and, several times finding the hole uncovered, recovered it. A pedestrian thereafter fell into the uncovered hole and was injured, for which he recovered damages against the city. Held, that the city had notice of the defect through its Lighting Superintendent, and was solely negligent in permitting the hole to remain in the street unprotected, and therefore could not recover against the telephone company any part of the damages recovered by the pedestrian.—United States Circuit Court of Appeals. F. R. 167, 485.

State University—Municipal Support

State vs. City of Lawrence.—The Legislature has the power to compel the city where the State University is located to issue the bonds of the city in aid of the State University, and to levy and collect a tax to pay such bonds; and the power to compel such city thus to furnish aid to the university includes the power to authorize it to do so after submitting the question to a vote of the electors of the city. —Supreme Court of Kansas. P. R. 100, 485.

Sidewalk Accident—Instructions—Harmless Error

Revis vs. City of Raleigh.—Where, in an action against a city for injuries to plaintiff through falling into an improperly covered hole in a sidewalk, the court instructed that the burden was on plaintiff to show that defendant knew, or by ordinary diligence might have discovered, the defect, and that the character thereof was such that injuries to pedestrians might have been anticipated, that the burden was also on plaintiff to show the dangerous condition, and that it had existed long enough before the accident for defendant to have known it, etc., a further instruction that, if defendant permitted the hole to remain for one week without inspection, it was liable, though erroneous, was not prejudicial to defendant; the evidence tending to show that the defect had existed for a much longer time than one week.—Supreme Court of North Carolina. S. E. R. 63, 150.

Stairway in Sidewalk—Negligence

Edwards vs. City of Raleigh.—A city was not negligent in permitting the existence of a stairway leading to a basement in a sidewalk, next to and parallel with a building, into which opening one nearly blind walked; the place being lighted, a rail running parallel with the building along the outside side of the opening, and there being six and a half feet of sidewalk in width after taking out the opening.—Supreme Court of North Carolina. S. E. R. 63, 1040.

Defective Culvert

Martin vs. City of St. Joseph et al.—Where a street obstructs a stream, the culvert being too small to pass the water, the fact that the outlet of the culvert was outside the city limits does not affect the liability of the city for the nuisance caused by the overflow; the liability being based on the maintenance of the embankment within the city limits with an insufficient outlet. Where a street obstructs a stream by providing too small a culvert to pass the water, the city's liability for the nuisance is not affected by the fact that it did not originally construct the street: its maintenance of the obstruction after the city limtis were extended to include the locality being sufficient to create the liability. Neither can the city escape liability if the culvert was too small by using due care to keep the embankment in proper condition, though such care might affect the extent of damages by lessening the amount of overflow.—Kansas City Court of Appeals. S. W. R. 117, 94.

Sewer Contract—Method of Figuring Compensation

City of Richmond vs. Barry.—A contract for the construction of sewers, which stipulates that the contractor shall furnish all materials, that excavations shall be done in the most careful manner, shoring all trenches with sheathing, piles and braces, and, where necessary, the same shall be left in the trenches to prevent settlement, does not give the contractor compensation for lumber left in the sewers and trenches. A contract for the construction of a sewer fixed the price "for bricks furnished and laid in sewer" at a specified sum per 1,000, and provided that the City Engineer should decide all disputes involved in the construction of the contract, amount and value of the work and materials furnished. There was no local custom entering into the contract, but the usage of trade was to measure the work and allow a designated number of bricks to a cubic foot and pay accordingly. Held, that the contractor was entitled to compensation at the specified rate per 1,000 bricks, ascertained by measurement of the work, allowing a specified number of bricks to a cubic foot, though the City Engineer determined that the contractor should be paid for the bricks ascertained by actual count.—Supreme Court of Appeals of Virginia. S. E. R. 63, 1074

Sewers—Bonds

State ex rel. City of Joplin vs. Wilder, State Auditor.—After a general sewer system had been established in a city, the corporate limits were extended, and two sewer districts were formed, one out of territory not served by the original system and the other in territory of the original system served in part by a distinct sanitary sewer; the city proposing to construct a sanitary sewer in the first additional district and a storm sewer in the other, each to be independent of the other and of the original system. The proposed sewers would drain only a limited portion of the city. Held, that the sewers were public sewers, for the construction of which the whole city could be taxed. Where the question of issuing bonds for the constructing of two distinct sewer systems in different parts of a city and levying an annual tax for their payment was submitted to the voters of the city as a single proposition, so that they had no other alternative than to vote for or against both systems, the submission was invalid.—Supreme Court of Missouri, 116 S. R., 1,087.

Work Done Not Within Contract

Borough Construction Co. vs. City of New York.—A sewer contractor may recover against the city, where its engineer violates the contract by compelling him to do work against objection and continued protest, on the wrongful insistence that it is within the contract, and its nonperformance would be a breach. Where a complaint against a city alleges that plaintiff's claim was presented to the Comptroller and he failed to allow or pay it, a denial in the answer of any knowledge or information thereof sufficient to form a belief is frivolous, where the claim was on file in the Comptroller's office.—New York Supreme Court. N. Y. S. 115, 697.

Street Obstructions—Frightening Animals

Elam vs. City of Mt. Sterling.—Where one suing a city for personal injury relied on the proposition that crossing stones piled in the street tendeded to frighten horses of ordinary gentleness, the petition should have pleaded it. A city was not negligent in leaving stone along the curbing of a street, and out of the traveled way, if it did not tend to frighten horses of ordinary gentleness; and hence is not liable for injury caused by a horse taking fright unless the horse was ordinarily gentle.—Court of Appeals of Kentucky. S. W. R. 117, 251.

Defective Streets—Highway Commissioners

Scott vs. Village of Saratoga Springs.—Under Laws 1902, providing that actions for any act done or omitted by Commissioners of Highways shall be brought against them in their name of office, and that any judgment recovered against them shall be paid out of any funds in their hands properly applicable thereto, etc., an action for injuries to a pedestrian on a defective sidewalk must be brought against the Commissioners, and not against the village.—New York Supreme Court. N. Y. S. 115, 797.

THE MUNICIPAL INDEX

In Which Are Listed and Classified by Subjects All Articles Treating of Municipal Topics Which Have Appeared During the Past Month in the Leading Periodicals

It is our purpose to give in the first issue of each month a list of all articles of any length or importance which have appeared in all the American periodicals and the leading English, French and German ones, dealing more or less directly with municipal matters. The index is kept up to date, and the month of literature covered each time will be brought up to within two or three days of publication. Our chief object in this is to keep our readers in touch with all the current literature on municipal matters. In furtherance of this we will furnish any of the articles listed in the index for the price named after each article; except that where an article is continued in two or three issues of the paper, the price given is for each of said issues. In addition to the titles, where these are not sufficiently descriptive or where the article is of sufficient importance, a brief statement of its contents is added. The length also is given, and the name of the author when it is a contributed article.

ROADS AND PAVEMENTS

Road Construction in Allen County, Ind., Cost of Macadam. 1-2 p., Engineering-Contracting, April 7. 10 cts.

Mountain Road Construction with a Steam Shovel in California. Ill., 1 p., Engineering-Contracting, April 7. 10 cts.

Economic Hints for Macadam Road Contractors. 1 p., Engineering-Contracting, April 7. 10 cts.

Theory of Economical Road and Street Design. 1 p., Engineering-Contracting, April 14. 10 cts.

Concave vs. Convex Roads. By Harold Turner. Ill., 2 1-2 pp., Surveyor, April 16. 20 cts.

Top Soil Method of Highway Construction. By C. M. Strahan. 1 1-3 p., Engineering Record, April 24. 10 cts.

Automobiles, Effect of, on Macadam Roads. Paper before Buffalo Legislative and Good Roads Convention. By L. W. Page. 2-3 p., Rock Products, April 22. 10 cts.

Asphalting Roads in New Jersey. Account of work done in 1908. 2-3 p., Municipal Journal and Engineer, April 21. 10 cts.

Tar, Oils and Emulsions, Use of, on Macadam and Earth Roads. Paper before Society of Wisconsin Engineers. By A. R. Hirst. 1 2-3 pp., Engineering-Contracting, April 14. 10 cts.

Paving in Kewanee, Ill. Data of kinds, costs and amount. Ill., 1 p., Municipal Journal and Engineer, April 7. 10 cts.

Paving the Streets of London. 2-3 p., Local Government Journal, April 17. 10 cts.

Asphalt Plant, Work of the New Orleans Municipal, in 1907-1908. 2-3 p., Engineering-Contracting, April 7. 10 cts.

Testing Asphalt. Chemical tests with carbon bisulphide, carbon tetrachloride and petroleum naphtha. Methods and comments on value. By Harry Tipper. 1 1-2 pp., Municipal Journal and Engineer, April 7. 10 cts.

Patented Pavements, Concerning. Communication from George C. Warren. 3-4 p., Municipal Journal and Engineer, April 7. 10 cts.

Brick Paved County Roadways. Ill., 2 pp., Clay Worker, April. 25 cts.

Burning Paving Brick with Natural Gas at Coffeyville, Kan. Ill., 2 1-2 pp., Clay Worker, April. 25 cts.

Concrete Pavement in Sioux City. Gravel streets in Escanaba, Mich. Ill., 1-2 p., Municipal Journal and Engineer, April 7. 10 cts.

Sidewalks, Oiled, in California. 1-2 p., Municipal Journal and Engineer, April 14. 10 cts.

Adjustable Form Holder and Cross Form for Cement Sidewalk Work. Ill., 2-3 p., Engineering-Contracting, April 21. 10 cts.

Street Encroachment at Milwaukee. 2-3 p., Real Estate News, April. 25 cts.

Viaduct, Difficult Erection of the Providence. Ill., 2 2-3 pp., Engineering Record, April 3. 25 cts.

Erection of the Arches of the Mulberry Street Viaduct, Harrisburg. Ill., 3 1-2 pp., Engineering Record, April 3. 25 cts.

Grade Crossings, Abolition of Railroad, in Philadelphia. Ill., 2 pp., Engineering Record, April 17.

Assessments for Street Paving. Discussion of the equities in the case. 1-2 p., Municipal Journal and Engineer, April 7. 10 cts.

Payments for Pavements. Paving in nineteen cities of the United States, showing the per cent paid for by the city and by the property owner. 1 p., Municipal Journal and Engineer, April 7. 10 cts.

Street Signs—Their Character and Location. Account of the location and styles of signs. Tabular data collected by the American Society of Municipal Improvements from 133 cities, showing the kinds of signs in use and the style preferred in each city. Ill., 6 pp., Municipal Journal and Engineer, April 28. 10 cts.

SEWERAGE AND SANITATION

Sewerage and Drainage Improvements at Cairo, Ill. Ill., 1 1-2 pp., Engineering Record, April 17. 10 cts.

Sewage System of Vancouver, B. C. 1 p., Canadian Engineer, April 2. 10 cts.

Practical Sewerage and Sewage Disposal. By H. C. H. Shenton. 1-3 p., Local Government Journal, April 17. 10 cts.

Dilution. Discharge of sewage into Boston Harbor. 1-2 p., Engineering Record, April 10. 10 cts.

Proposed Method of Discharging Sewage from the Passaic Valley into New York Bay. 1-2 p., Engineering Record, April 10. 10 cts.

River Pollution: Its Ethics, Esthetics and Hygiene. Discussion at the Royal Sanitary Institute. 4 pp., Surveyor, April 16. 20 cts.

The Kinnickinnic River Flushing Tunnel and Pumping Station, Milwaukee, Wis. By W. J. Sando. 6 pp., Industrial Progress, April. 25 cts.

Sewer Tunnel Construction in Cleveland, O. 2-3 p., Engineering Record, April 10. 10 cts.

Manhole Head, Concrete. Ill., 1-3 p., Municipal Journal and Engineer, April 28. 10 cts.

Flushing, Sewer. Ill., 2 pp., Canadian Engineer, April 23. 10 cts.

House Drainage, Modern. Paper before Institute of Sanitary Engineers. By John Lawrence. 1-2 p., Local Government Journal, April 3. 10 cts.

Disposal, Problem of Sewage. By W. D. Scott-Moncrieff. 4 pp., Surveyor, March 26; 2 pp., April 2; 3 pp., April 9. 20 cts.

Latest Theory Regarding Artificial Sewage Treatment. By A. S. Jones. 4 pp., Royal Institute of Public Health, April. 60 cts.

Operation of the Columbus Sewage Disposal Works. 1-2 p., Engineering Record, April 17. 10 cts.

Contact Versus Percolating Filters. 1 1-2 pp., The Canadian Engineer, April 9. 10 cts.

Electrolytic Treatment of Sewage. Cost of nine months' experience at Santa Monica, Cal. By C. B. Irvine. 1-3 p., Municipal Journal and Engineer, April 28. 10 cts.

Microbes, Mortality of. 2-3 p., Contract Journal, April 14. 20 cts.

Health Administration in North Carolina, Ontario and Great Britain, State and Local. 1 1-2 pp., Engineering News, April 15.

New York State Health Department. Synopsis of work of 1908. 1-3 p., Municipal Journal and Engineer, April 21. 10 cts.

Extracts from 29th Annual Report of the New York State Commissioner of Health. 4 pp., Bulletin Department of Health, March. 10 cts.

Health Legislation by the General Assembly of North Carolina of 1909. 25 pp., Bulletin North Carolina Board of Health, March, 1909. 10 cts.

The Washington Public Health Program. 5 pp., American Health Magazine, March. 10 cts.

Sanitary Organization of a Small French City, Example of the. 4 1-2 pp., La Technique Sanitaire, April. 50 cts.

Officer of Health, Duties and Difficulties of a Medical. By J. A. Hutchinson. 1 1-2 pp., Canadian Engineer, April 16. 10 cts.

Typhoid in Washington. Failure of Health Department to prevent the spread of the disease. 1-3 p., Municipal Journal and Engineer, April 21. 10 cts.

Tuberculosis, Control of the Spread of, Through Meat and Milk. By A. M. Fraser. 5 pp., Royal Institute of Public Health, April. 60 cts.

WATER SUPPLY

Water Supply of Danville, Ill. 1-3 p., Municipal Journal and Engineer, April 28. 10 cts.

Village Water Supply, Post City, Tex. Ill., 1-2 p., Rock Products, April 22. 10 cts.

Waltham Water Works. Ill., 2-3 p., Fire and Water, April 7. 10 cts.

Water Supply of the Island of Teneriffe. Ill., 2 pp., Water, April 15. 20 cts.

Water Works System of Glenwood, W. Va. Ill., 2-3 p., Fire and Water, April 14. 10 cts.

Champaign-Urbana Water Works. Undergronud supply, iron removal by aeration. Ill., 1 1-4 pp., Municipal Journal and Engineer, April 14. 10 cts.

New Bedford Water Works. Policy of furnishing city departments with free water. Electrolysis of water mains. High efficiency of Leavitt pumping engines. Novel and effective eel screen. Ill., 4 pp., Municipal Journal and Engineer, April 7. 10 cts.

Ancient and Modern Water Supplies. By T. A. Starkey. Ill., 4 1-2 pp., Canadian Municipal Journal, April. 10 cts.

Haverhill, Mass., Water Works. Financial statement for 1908. Duty obtained with high duty pumping engines in regular service. Reducing water waste. 1 p., Municipal Journal and Engineer, April 14. 10 cts.

Water Supply. Paper before Union of Alberta Municipalities. By Muir Edwards. 3 1-2 pp., Western Municipal News, April. 10 cts.

Water Department, New York City. 1-2 p., Fire and Water, April 21. 10 cts.

Storage of River Waters. Report to the Metropolitan Water Board. By A. C. Houston. 2 pp., Surveyor, April 2; 2 1-2 pp., April 9. 20 cts.

The Storage of Raw River Water Before Filtration. 1 1-2 pp., Water, April 15. 20 cts.

Purification, Effects on Water, by Storage. 3 pp., Canadian Engineer, April 23. 10 cts.

Adirondack Storage. Ill., 2-3 p., Fire and Water, April 7. 10 cts.

Dam, Pipen Brook, Stanwich, Conn. Ill., 1 1-2 pp., Engineering Record, April 3. 25 cts.

Olive Bridge Dam Concrete Plant. Ill., 1 2-3 pp., Engineering Record, April 3. 25 cts.

Concrete Dam, Sydney, Australia, Water Works. Ill., 6 pp., Cement World, April. 15 cts.

Concrete and Masonry Dam Construction in New South Wales. 1 1-2 pp., Water, April 15. 20 cts.

Arrowhead Hydraulic Fill Dam. By F. C. Finkle. Ill., 2 1-2 pp., Engineering Record, April 3. 25 cts.

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Artesian Wells in the London Basin. 1 1-3 pp., Contract Journal, April 7. 20 cts.

Pumping Wells by Compressed Air for Water Supply at Palmerston, Ont. By O. W. Smith. Ill., 4 pp., Canadian Engineer, April 9. 10 cts.

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Pipe, Constructing and Laying Cement-Lined Water, at Plymouth, Mass., and Portland, Me. 2 pp., Engineering-Contracting, April 7. 10 cts.

Tests of Lock Bar Pipe of the Springfield, Mass., Water Department. Ill., 2-3 p., Engineering Record, April 17. 10 cts. Ill., 1-2 p., Engineering News, April 15. 15 cts.

Laying Submerged Pipe for the Fort Greble Water Supply. Ill., 1 1-3 pp., Engineering Record, April 3. 25 cts.

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Ozone as Applied to Water Purification. By R. M. Legget. 1 p., Canadian Engineer, April 2. 10 cts.

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Sedimentation of the Water Supply and Its Relation to Typhoid Fever in Washington, D. C. By F. F. Longley. Ill., 2 pp., Engineering News, April 22. 15 cts.

Analyzing Water in Illinois. Account of the work of the Illinois State Water Survey. Examinations of well waters. Interpretation of the results of analyses. Physical, chemical and bacterial examination. Standards of purity. 1 1-4 pp., Municipal Journal and Engineer, April 7. 10 cts.

Meters, Use of Woltmann Water, in the Supply and Distribution of Water to Cities. Ill., 4 pp., La Technique Sanitaire, April. 50 cts.

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Hydraulic Tables. Paper before Montana Society of Engineers. By J. H. Harper. 5 pp., Journal of the Association of Engineering Societies, February. 30 cts.

Investigation of the Coefficients of Discharge of Thin-Edged Weirs with Full End Contractions Discharging Water Under Low Heads. 15 pp., Stevens Institute Indicator, January. 50 cts.

STREET LIGHTING AND ELECTRIC POWER

Street Lighting in Europe. 1-2 p., Electrical Review, April 17. 10 cts.

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Value of Reflectors for Incandescent Lighting, Economic. By C. O. Baker. Illustrated. 1 1-2 pp., Illuminating Engineer, April. 20 cts.

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New Electrical Laboratory Equipment of the City of Philadelphia, Pa. 2 pp., Electrical Review, April 3. 10 cts.

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Fire Appliances for Small Municipalities. Paper before Union of Alberta Municipalities. By James Smart. 1 p., Canadian Municipal Journal, April 10. 10 cts.

New Fire Extinguishing Substance. Account of a German invention for extinguishing inflammable liquids by the use of foam. 1-3 p., Municipal Journal and Engineer, April 28. 10 cts.

High Pressure Service, Winnipeg's. By H. B. Ross. Description of independent service supplying river water for fire protection. Illustrated. 2 1-2 pp., Municipal Journal and Engineer, April 28. 10 cts.

Streams for Fire Protection. By G. C. Havermeyer. 1-2 p., Fire and Water, April 21. 10 cts.

Plant, Oakland's New Fire-Fighting. 4 1-2 pp., Pacific Municipalities, March. 10 cts.

Service, Metropolitan Fire. Illustrated. 1 1-2 pp., Fireman's Herald, April 17. 5 cts.

Work of Superior, Wis., Fire Department. 2-3 p., Fire and Water, April 7. 10 cts.

Report on a Political Fire Department. 3-4 p., Fireman's Herald, April 10. 5 cts.

Fire Alarm Box and Pedestal. Description of design adopted in Syracuse, N. Y. Illustrated. 2-3 p., Municipal Journal and Engineer, April 21.

Fireproof Construction. Report of Committee of National Fire Protection Association. 3-4 p., Fire and Water, April 7. 10 cts.

Policed, How the City of Denver is. Illustrated. 3 pp., Denver Municipal Facts, April 3. 10 cts.

Two-Platoon Fight, Chicago's. 1 1-2 pp., Fireman's Herald, April 10. 5 cts.

Bertillon System of Identification, The. By Persifor Frazer. 21 pp., Journal of the Franklin Institute, April. 50 cts.

GOVERNMENT AND FINANCE

Commission Form of City Government, Value of the. By J. Dillon. 3 1-2 pp., Albany Citizen, April. 10 cts.

Municipal Parliament. Annual Meeting of the Municipal Corporations. 5 pp., Municipal Journal, April 2. 15 cts.

Municipal Council, By-Law to Regulate the Proceedings of a. 2 1-2 pp., Western Municipal News, April. 10 cts.

Public Utilities Bill, Vermont. By Glen Marston. 1 1-2 pp., Public Service, April. 20 cts.

Profit Sharing in Public Utilities. By H. W. Winslow. Public Service, April. 20 cts.

Detriment to the Public in Franchise Controversy. 3-4 p., Electric Railway Journal, April 10. 10 cts.

Consolidated Gas and the Knoxville Water Cases. By C. W. Gerstenberg. 20 pp., Journal of Accountancy, March. 25 cts.

Rate Making for Public Utilities. By Halford Erickson. 2 1-2 pp., Electric Railway Journal, April 24. 10 cts.

Reasonable Rates. 1 p., Electrical Review, April 24. 10 cts.

Supreme Court and New York Gas Rate. 4 1-2 pp., Midland Municipalities, April. 10 cts.

Expenses in Public Service Operation, Extraordinary. 3-4 p., Electrical Review, April 24. 10 cts.

Debt Limit, Exempting Bonds from City. Account of legislation advocated by the Citizens' Union of New York City. 1-3 p., Municipal Journal and Engineer, April 14. 10 cts.

Tax for Firemen, Illinois Insurance. 1-2 p., Fireman's Herald, April 24. 5 cts.

Accounting System for Wisconsin Public Utilities, Discussion of New. 2 pp., Electric Railway Journal, April 24. 10 cts.

Practical Application of the new Wisconsin Accounting System. 2 pp., Electric Railway Journal, April 24. 10 cts.

Report on Uniform Municipal Accounting. By Committee of the Union of Canadian Municipalities. 4 pp., Canadian Municipal Journal, April. 10 cts.

Uniform Municipal Accounting in Canada. Draft of report to be made to Union of Canadian Municipalities. 1-3 p., Municipal Journal and Engineer, April 7. 10 cts.

Some principles of Cost Accounting. By Ernest Reckitt. 21 pp., Journal of Accountancy, March. 25 cts.

Information for Tax Payers. Methods employed in Memphis, Tenn., for explaining city expenditures. 3-4 p., Municipal Journal and Engineer, April 14. 10 cts.

STREET CLEANING AND REFUSE DISPOSAL

Street Cleaning in New York. Methods employed and their unit costs. Account of several devices on trial. Illustrated. 5 1-4 pp., Municipal Journal and Engineer, April 21. 10 cts.

Refuse Destructor, Acton. Illustrated. 1 p., Municipal Journal, April 2. 15 cts.

Design and Working of a Modern Destructor. Paper before Association of Municipal and County Engineers. By W. F. Loveday. 3 pp., Surveyor, April 9, 20 cts.; 2 pp., Contract Journal, March 31. 20 cts.

Milwaukee Refuse Incinerating Plant Specifications and Contract Award. 1-2 p., Engineering News, April 22. 15 cts.

Milwaukee Refuse Incinerator. Account of methods adopted for comparing bids based on cost of operation. 1 1-2 pp., Municipal Journal and Engineer, April 14. 10 cts.

Specifications and Bids for a Refuse Incinerating and Power Generating Plant for Milwaukee, Wis. 2 pp., Engineering News, April 22. 15 cts.

Clinker, Utilization and Disposal of Destructor. By E. R. Sutcliffe. Illustrated. 3 pp., Surveyor, March 26. 20 cts.

TRAFFIC AND TRANSPORTATION

Street Railway Question in Detroit, Investigation of the. 2 pp., Electric Railway Journal, April 10. 10 cts.

Crises in Street Railway Operation. By F. W. Coburn. 4 pp., Public Service, April. 20 cts.

Costs, Street Railway. Abstract of testimony of M. E. Cooley before Wisconsin Utilities Commission. 2 pp., Public Service, April. 20 cts.

Fare Case, Hearing on Milwaukee, by Wisconsin Railroad Commission. 6 1-2 pp., Electric Railway Journal. April 3; 4 pp., April 10; 5 1-2 pp., April 24. 10 cts.

Power House of the London County Council, Tramway. Paper before Institution of Electrical Engineers. By J. H. Rider. 3 pp., Contract Journal, March 31. 20 cts.

Track in Charlotte, N. C., Street Railway. Illustrated. 1 p., Engineering Record, April 24. 10 cts. Illustrated, 1 1-2 pp., Electric Railway Journal, April 24. 10 cts.

Switching Installations in Washington, D. C., Automatic. Illustrated. 3 pp., Electric Railway Journal, April 17. 10 cts.

Electric Interlocking and Signaling System for the Street Railways at the Union Station Plaza, Washington, D. C. Illustrated. 1 p., Engineering News, April 15. 15 cts.

Trackless Trolley Omnibuses, Electric, in Vienna and other European Cities. Illustrated. 1 2-3 pp., Electrical Review, April 10. 10 cts.

Trackless Trolley System. Line in operation in the suburbs of Vienna. By Consul-General A. M. Thackara. Daily Consular Reports, April 26. 10 cts.

Continuous Trains for Subways of the Continuous Transit Securities Co. Illustrated. 1 p., Municipal Journal and Engineer, April 14. 10 cts.

Car, Prepayment, of Corridor Type Tried in Pittsburg. Illustrated. 1 p., Electric Railway Journal, April 17. 10 cts.

Discussion on Side-Door Subway Cars in New York. 2 pp., Electric Railway Journal, April 10. 10 cts.

Ventilation of the Washington Street Tunnel, Boston. Illustrated. 1 p., Engineering Record, April 24. 10 cts.

STRUCTURAL MATERIALS

Cement, Life of Portland. Paper before Iowa Cement Users' Convention. By G. G. Wheat. Illustrated. 6 pp., Clay-Worker, April. 25 cts.

Concrete, its Aggregates and Mixing. Paper before Association of Municipal and County Engineers. By Wm. Challoner. 3 pp., The Surveyor, April 12, 20 cts.; 1 1-2 pp., Contract Journal, March 31. 20 cts.

Wet and Dry Mixtures of Concrete. By H. M. Landis. Illustrated. 4 pp., Cornell Civil Engineer, April. 25 cts.

A New Test for Concrete. 1-2 p., Engineering Record, April 10. 10 cts.

Corrosion of Steel Reinforcement in Concrete. Paper before Society of Engineers. By E. R. Matthews. 4 pp., Surveyor, April 9. 20 cts.

Electrolysis of Reinforced Concrete. Paper before Engineers' Club of St. Louis. 5 pp., Journal of the Association of Engineering Societies, February. 30 cts.

Some Practical Ideas on Reinforced Concrete Design. From paper before Armour Civil Engineering Society. By Ernest McCullough. 4 pp., Engineering-Contracting, April 14. 10 cts.

Artistic and Commercially Practical Surface Finishes for Concrete Work. By J. H. Chubb. Illustrated. 2 pp., Engineering Record, April 3. 25 cts.

Large Concrete Retaining Wall. Illustrated. 1 1-2 pp., Engineering Record, April 3. 25 cts.

Concrete in Arched Bridge Construction. From paper before Concrete Institute. By E. P. Wells. 2 pp., Surveyor, March 26. 20 cts.

Building Concrete Culverts in Freezing Weather. By J. H. Ryckman. 1-2 p., Engineering Record, April 17. 10 cts.

Hints to Inspectors of Concrete Work—Form Work. Illustrated, 1 1-3 pp., Engineering-Contracting, April 7; 1 p., April 21. 10 cts.

Timbers of Commerce and Sources of Future Supply. By J. H. Elwes. 1 p., Contract Journal, March 24. 20 cts.

BRIDGES

Description of Great St. Louis Free Bridge. By L. C. Breed. 2 pp., Municipal Engineering, April. 25 cts.

Atlantic Avenue Bridge Extension, Boston. Illustrated. 2 pp., Engineering Record, April 3. 25 cts.

Mississippi River Boulevard Bridge at St. Paul. Illustrated. 1 p., Engineering Record, April 3. 25 cts.

Design of Bridges with Reference to Æsthetic Treatment. By Robt. Boyle. Illustrated. 4 pp., Contract Journal, April 14. 20 cts.

Erection of the Suspended Superstructure of the Manhattan Bridge, New York. Illustrated. 1 1-3 pp., Engineering Record, April 3. 25 cts.

Different Erection Methods for Scherzer Lift Spans. Illustrated. 1 2-3 pp., Engineering Record, April 3. 25 cts.

Contractors' Plant on the Connecticut Avenue Bridge, Washington. Illustrated. 2 pp., Engineering Record. April 3. 25 cts.

Concrete Bridge Specifications. Paper before Iowa Cement Users' Association. By T. H. McDonald. 2 pp., Municipal Engineering, April. 25 cts.

Concrete Bridge Specification. By T. H. McDonald. Paper before Iowa Association of Cement Users. 3 pp. Cement Age, April. 15 cts.

Forms for Concrete Highway Bridge. Paper before Northwestern Cement Association. By F. A. B. Peterson. 2 pp. Cement World, April. 15 cts.

Costs of Reinforced Concrete Bridges. Paper before National Association of Cement Users. By E. P. Goodrich. 3½ pp. Cement Age, April. 15 cts.

Cost of Concrete Bridges. Paper before National Association of Cement Users. By H. H. Quimby. Illus. 5 pp. Cement Age, April. 15 cts.

Maintenance of Bridges, Recommended Practice for, Including Protection from Corrosion. From report of committee of American Railway Engineering and Maintenance of Way Association. 2 pp. Engineering-Contracting, April 7. 10 cts.

MISCELLANEOUS

Town Planning in Practice. Illustrated. 5 pp. Municipal Journal, April 16. 15 cts.

Town and City Planning. ½ p. Engineering Record, April 10. 10 cts.

The Expansion of Perth. Illus. 1 p. Municipal Journal, April 9. 15 cts.

Chicago Harbor Commission's Views on Lake Front. 1½ pp. Real Estate News, April. 25 cts.

City Building at Georgetown, O. One building contains council chamber, court room, jail, fire department, electric light plant and public auditorium. Illus. 2 pp. Municipal Journal and Engineer, April 21. 10 cts.

New City Hall for Perth. Ill. 1 p. Surveyor, March 26. 20 cts.

First Public Bath in Porto Rico. ¼ p. Municipal Journal and Engineer, April 7. 10 cts.

Housing, Report on, by Sheffield Committee. 1 p. Municipal Journal, April 9. 15 cts.

Bringing Country to Town. An example of English Co-operative Estate Development. By J. S. Nettlefold. Illus. 6 pp. Survey, April 3. 25 cts.

Creating the Newest Steel City. By J. R. Taylor. 17 pp. Surveyor, April 3. 25 cts.

House Numbering, Systems of. Data from 136 cities. Forms of application. Official who has charge of the numbering. Kinds of figures used. Plan followed in assigning numbers. Ill. 6½ pp. Municipal Journal and Engineer, April 7. 10 cts.

Smoke on Railroads, Problem of Reducing. Paper prepared at the request of the American Civic Federation. By A. W. Gibbs. 1 2/3 pp. Engineering News, April 22. 15 cts.

Bill-Board Plague and the Courts. 3 pp. Real Estate News, April. 25 cts.

To Abolish Bill Boards. Practical methods adopted by Kansas City, Mo. 1/3 p. Municipal Journal and Engineer, April 7. 10 cts.

Playgrounds in Germany. By Consul-General R. P. Skinner. 1 p. Daily Consular Reports, April 5. 10 cts.

History of Playground Beginnings in Detroit, Mich. By C. B. Arthur. Ill. 6 pp. The Playground, April. 10 cts.

Fountains for Horses, City. Account of drinking fountains by the American Society of the Prevention of Cruelty to Animals and others in New York and other American Cities. 4 pp. Municipal Journal and Engineer, April 14. 10 cts.

Buying Coal by Heating Value. Great economy effected by the plan of the Federal Government for purchasing coal for use in public buildings under specifications limiting amounts of ash and moisture. 1 p. Municipal Journal and Engineer, April 28. 10 cts.

Analysis of the Subject of Coal Analysis. Paper before Illinois Fuel Conference. By N. W. Lord. 3 pp. Power, April 13. 5 cts.

Carbonic Acid Recorders. By W. F. McKnight. 2½ pp. Canadian Engineer, April 16. 10 cts.

Paying for Value Received. Arguments for the purchase of supplies of all kinds by system of measurements indicating actual value in use. ½ p. Municipal Journal and Engineer, April 28. 10 cts.

Feeding City Prisoners, Cost of. Records of the city prison of San Francisco. 1/3 p. Municipal Journal and Engineer, April 28. 10 cts.

Publicity, New Utility. 1 p. Public Service, April. 20 cts.

Municipal Publicity Periodicals. Comparison of papers issued by cities of San Francisco, Denver and New York. ¾ p. Municipal Journal and Engineer, April 21. 10 cts.

Information for citizens. Pamphlet issued by Baltimore Police Commissioners. ¼ p. Municipal Journal and Engineer, April 14. 10 cts.

Damage Suits Against Municipalities. Notice to municipality of accident as condition precedent to suit—Requirements in various states—Concrete illustrations thereof—Place, time, nature of injury and purpose of notice necessary. By Howard C. Lake. 2 pp. Municipal Journal and Engineer, April 28. 10 cts.

Boiler Inspection in Greater New York. By A. C. Rowsey. Ill. 5½ pp. Power, April 20. 5 cts.

Ambulance Services, Public. 1 p. Municipal Journal, April 9. 15 cts.

Utilities, Henderson's Public. Description of Municipal Electric Lighting, Gas Lighting and Water Works Plants. Ill. 4 pp. Municipal Journal and Engineer, April 7. 10 cts.

Photography, Engineering. By W. M. Christie. Ill. 3 pp. Engineering Record, April 3. 25 cts.

Excavation. Plowing as a Means of Classifying. 2 pp. Engineering Record, April 10. 10 cts.

The Engineer and His Work. Paper before Canadian Society of Civil Engineers. By John Galbraith. 4 pp. Canadian Engineer, April 2. 10 cts.

Relation of the Engineer to the Community. Address before the McGill Engineering Society. By C. B. Smith. 1 p. Canadian Engineer, April 23. 10 cts.

Dump Wagons, Comments on. 1½ pp. Engineering Contracting, April 7. 10 cts.

Conservation of Natural Resources, Joint Conference on, of the Four National Engineering Societies. 2 pp. Electrical Review, April 3. 10 cts.

Poor Laws and the Relief of Distress, English Royal Commission on the. By C. S. Loch. 9 pp. Survey, April 3. 25 cts.

BOOK REVIEWS

Land Treatment of Sewage. By Herbert T. Scoble. New York: D. Van Nostrand Company. Size 8 by 11, 70 pages. Price, $2.00, net.

This book contains a reprint from the "Surveyor and Municipal and County Engineer" of a number of papers printed at intervals and containing a digest of the reports made to the Royal Commission on Sewage Disposal by their specially appointed officers. As the title indicates, this work deals with land treatment only, including filtration and irrigation. It confines itself almost exclusively to the disposal fields of eight English cities, giving for each one the details of construction, acreage, population, analyses of sewage and effluent and conclusions as to the efficiency of the plant. Four pages also are devoted to a description of visits to six other disposal grounds, and eight pages to sundry notes, general conclusions and the author's summing up. This work contains little, if anything, which is new, but serves to condense into practical size the information obtained by the Royal Commission concerning these several plants. The book is originally published in England and, like most works published there, contains no date. We find no reference, however, to reports or data given out at a later date than 1905, and we assume that it was written soon after that.

Principles of Sewage Treatment.—By Prof. Dr. Dunbar. Translated by H. T. Calvert. Philadelphia: J. B. Lippincott Company. Cloth, octavo, 271 pages, 147 illustrations. Price, $4.50, net.

Professor Dunbar is Director of the Hamburg State Hygienic Institute, and the translator is Chief Chemical Assistant, West Riding of Yorkshire Rivers Board. There are several reasons why this work should be read by all who are making a study of sewage treatment. One is for its intrinsic value as a general treatise on sewage disposal. The more important reason, however, is that the subject is therein treated from a view point somewhat different from that occupied by English or American writers on the same subject. While the latter occasionally refer to one or two German sewage disposal plants, and the Berlin sewage farm has been described more or less fully several times, the experimental work done by German scientists and engineers and the smaller plants are practically overlooked in all descriptions. Prof. Dunbar shows that he and others of his countrymen have done work along these lines which is worthy of more recognition. Another important feature of this work is that English experiments, results and plants are described by one who has no national prejudice for or against certain methods or investigations, and has not come under the influence of British engineers who are all more or less wedded to certain theories. The experiences of German cities have been obtained under conditions more similar in certain respects to those in the eastern part of the United States than is the case with the English plants, because the soil in practically all of England is of a clayey nature and conclusions reached there would not necessarily apply to sandy or gravely soil, such as is found in Germany as well as here.

The author seems to be at some disadvantage in not having visited American plants, and confines his description of and conclusions drawn from American practice largely to the reports of the Massachusetts State Board of Health. To this Board, however, he gives the credit of having done more thorough and scientific work than has been done by any other city or organization. He disagrees on one point with the majority of English and American engineers, or perhaps it would be more correct to say that he is somewhat in advance of them in his opinion of the beneficial effectiveness of septic tanks. Most engineers now agree that septic treatment should be considered as merely a preliminary, and even the English engineers are beginning to return to simple sedimentation; so that Dr. Dunbar in expressing the same opinions is in accord with the more advanced engineers of England and America. He, however, goes a little further and states that biological after-treatment is usually more difficult with septic tank effluent than with fresh sewage, instead of being less difficult as has been claimed; that the accumulation of putrefying substances near dwelling houses is unsanitary; that the sulphuretted hydrogen formed in septic tanks attacks and decomposes cement, and that less than 50 per cent of the organic matter is gasified and liquified, instead of practically all of it as has been claimed.

The book is divided into two parts, the first being a statement of the Historical Development of the Sewage Problem, occupying 29 pages, and the remainder being devoted to the Present Position of Sewage Treatment. The latter part describes the characteristics of sewage; the objects of purification works; the various methods for removing suspended matters, and those for removing putresibility; the disinfection of sewage; the supervision and inspection of sewage disposal works; and the utility and cost of the various methods of sewage treatment.

Engineering Aspect of Recent Advances in Connection with Sewering. By W. D. Scott-Moncrieff. London: St. Bride's Press. Paper. 8 vo. 79 pp. Price, 2 shillings.

This pamphlet contains four lectures delivered at the University of London, as provided for by bequest of Sir Edwin Chadwick. These were popular in their nature, but the review of the entire subject is guaranteed as to its reliability by the high reputation of their author. The first lecture is largely historical, the second deals chiefly with sewerage in general, and the third and fourth with sewage disposal. The author states that the contributions of C. E. A. Winslow and E. B. Phelps, of the Massachusetts Institute of Technology, present the best history of the subject of sewage disposal which has been printed. Incidentally he refers to the Reports of the Royal Commission on Sewage Disposal as having failed "to arrive at any sort of basis which can be spoken of as even remotely scientific." Proper credit is given to the writings of Rawlinson and Latham as being still among the best guides for designing. As a general and brief résumé of the subject these lectures will be found admirable by both students and engineers in this country, as well as abroad.

General Bacteriology. By Edwin O. Jordan. Philadelphia, Pa., W. B. Saunders Company. Cloth, 8 vo. pp. 545. Price $3.00 net.

The author is Professor of Bacteriology in the University of Chicago and in Rush Medical College. This book is the outgrowth of lectures to students in the former, and is an attempt at presenting "a general introduction to the subject, with some regard for perspective and with emphasis on general rather than on special questions." This does not mean that the treatment is popular, for it is strictly technical, and is intended for the student rather than for the cursory reader. The information is presented tersely and compactly, and even a list of the chapter headings would require considerable space. These include Structure, Mode of Development and Composition of Bacteria, Effect of Various Agents on Them and Those Produced by Them, Classification, Relation to Disease; twenty-two chapters treating of the various species follow; the Bacteriology of Milk, Bacteria and the Nitrogen Cycle, Bacteria in the Arts and Industries, Bacteria of Air, Soil and Water, and Bacterial Diseases of Plants are the concluding chapters of the thirty-five comprising the volume. There is an appendix on Infectious Diseases of Unknown Causation. For any but the expert, this work furnishes abundant information concerning bacteria in their relation to health and disease, based upon the latest discoveries, and without bias of judgment.

NEWS OF THE SOCIETIES

Municipal League of Indiana.—The annual meeting of the League will take place at Lafayette, Ind., June 22-24. Manufacturers of municipal supplies and appliances are invited to be present and exhibit or demonstrate their products. J. W. Schooler, Comptroller of the city of Lafayette, is secretary of the League.

Municipal Engineers of the City of New York.—On Saturday, May 1, a trip of inspection was made by members of the society to the site of the proposed Eighth Ward Market, Brooklyn, where a concrete bulkhead wall on a crib foundation 1,800 feet long has been recently completed.

Playground Association of America.—The Third Annual Congress of the Association will be held at the Carnegie Music Hall, Schenley Park, Pittsburg, Pa., May 10 to 14, 1909. On Monday the opening reception will be at 8:00 p. m. at the Carnegie Art Gallery. Addresses of welcome will be delivered by Mayor Wm. A. McGee and Buelah Kennard, President of the Pittsburg Playground Association. The response and annual address will be by Luther H. Gulick, President. On Tuesday the following topics will be discussed: "Story Telling in the Playground," "Playground Statistics," "Equipment and Normal Courses in Play." A meeting of the Board of Directors will be held and a luncheon served at Hotel Schenley. In the afternoon there will be a Game Festival. In the evening a general meeting will be held, when a stereopticon exhibition will be given and addresses delivered on "Good Health and Good Government," by J. F. Burke, and "The Spirit of Youth and the City Streets," by Jane Addams. On Wednesday the following topics will be discussed: "State Laws," "Athletics for Boys," and "Athletics for Girls." In the afternoon visits will be made to the parks. In the evening a general meeting will be held and a stereopticon exhibition will be given. Addresses will be delivered on "Rights and Privileges of Childhood," by Stephen S. Wise and Jos. Lee, and "Why Teach a Child to Play?" by G. E. Johnson. On Thursday the following topics will be discussed: "Play in Institutions," "Festivals," "Folk Dancing" and "Playgrounds as Social Centers." A Congress Luncheon will be given at Hotel Schenley at 1 p. m. In the afternoon visits will be made to a number of Pittsburg industrial plants. In the evening will be a festival of folk songs and folk dances. On Friday there will be a meeting of the Council, when reports of officers and committees will be made and the election of officers held. The program will include a conference of Y. M. C. A. delegates, a conference of state and municipal representatives and a meeting of the Board of Directors. In the afternoon a Play Festival and May Celebration will be held at Schenley Park.

Albany Society of Civil Engineers.—At a meeting April 28, at the Albany Institute and Historical and Art Society Building, 119 Washington street, a lecture in "Stucco, Hollow Block and Monolithic Construction for Buildings" was given by Russell S. Greenman, resident engineer in charge of tests in the State Engineer's department. The lecture was designed to arouse interest in the practical and artistic possibilities of concrete as a building material.

Exhibition on City Planning.—The Committee on Congestion of Population and the Municipal Art Society of New York have arranged the following special days for various organizations during the exhibit on city planning and municipal art. Special invitations will be sent to those who would be interested in attending the exhibit:

Tuesday, May 4, ladies' day.
Wednesday, May 5, official municipal day.
Thursday, May 6, doctors' day.
Friday, May 7, real estate and civic organizations' day.
Saturday, May 8, church day.
Monday, May 10, New Jersey day.
Tuesday, May 11, commercial day.
Wednesday, May 12, teachers' day.
Thursday, May 13, engineers' and architects' day.
Friday, May 14, rentpayers' day.
Saturday afternoon, May 15, city planning day.
Saturday evening, May 15, State night.

Monday, May 10, has been designated by the managers of the exhibition as "New Jersey Day," and will be devoted to a series of conferences on problems of city planning especially affecting New Jersey. Tunnel transit, Hudson River bridges, and the development of the Newark meadows as the great freight terminals of the railroads entering New York, will be among the subjects considered. Lectures will be given and discussions held to supplement the showing of plans, models, drawings and photographs. Among the chief purposes of the exhibition is the project to establish a permanent commission on city planning, such as exists in European cities.

National Congress on City Planning.—The committee appointed to select a hall for the exhibit for city planning at Washington, D. C., under the auspices of the Chamber of Commerce, Board of Trade and Federation of Laymen, in connection with the National Congress on City Planning, has selected the Raleigh Hotel, Washington, as headquarters for exhibit and dinner, May 21 to 29.

Municipal Art Society of St. Paul, Minn.—Regarding the immediate aim of the society, Secretary F. B. Lynch says: "We have restricted our attention to the capitol approach plans because of the great importance of immediate and systematic action being taken thereon. We hope to give active cooperation in the first step now being undertaken for these approaches—the plan for an adequate approach leading from Seven Corners to the State House. I think our action in this connection can be made most effective; this, however, is but part of the magnificent plan that was placed before the city two years ago. The expense that must be incurred will require careful consideration, but in all action taken the city must at all times have in view the ultimate fulfillment of the complete system of approach. It is here the educative value and force of an intelligent and earnest body of men and women can be productive of the greatest good.

Florida State Electric Association.—At a meeting and banquet at the San Juan, Orlando, a permanent organization was effected and officers elected as follows: President, H. A. Grant, Orlando; vice-president, W. M. Bostwick, Jacksonville; secretary and treasurer, George F. Doig, Gainesville; directors, F. E. Fletcher, Tampa; C. H. Ellis, Tallahassee. The committee on constitution reported and a full set of by-laws and a constitution were adopted.

Civil Engineers of Ohio.—The civil engineers of Summit, Stark and adjoining counties effected an organization at Canton in January. John Holl, of Canton, was chosen president, T. D. Hall vice-president and L. K. Zerbe secretary. An invitation is extended to all civil, mechanical and electrical engineers, draftsmen, architects and studets to meet, whether they join or not. A meeting was held at the office of County Surveyor J. A. Gehres at Akron, when addresses were made by Judge D. A. Doyle and Z. T. Herndon, who all urged that such an organization should be of great benefit. Further information may be had from T. D. Paul, J. A. Gehres or J. W. Payne, who have been selected as a committee to promote the interests of the society and enlarge the membership.

The Civic League of St. Louis.—The Executive Board has issued its annual statement pointing out briefly some significant facts in the growth and accomplishments of the League since its reorganization four years ago. On March 1, 1906, the membership roll contained 809 bona fide members—on March 1, 1909, it contained 1,547 members, an increase in three years of almost 100 per cent. At the close of the fiscal year, March 1, 1906, the Executive Board was confronted with a deficit of $285.83—on March 1, 1909, the Treasurer's report indicated a surplus of $3,135.08. The total income in 1905-6 was $4,487.08; in 1908-9 it was $11,642.50, an increase of approximately 150 per cent. In the year 1905-6 the expenses were $4,772.91; in 1908-9 they were $8,632.82, an increase of 55 per cent. In brief, the membership in the past three years has increased approximately 100 per cent, the income 150 per cent, while the expenses have increased only 55 per cent. This encouraging condition is, the report says, due to the fact that the League has been accomplishing results which have met with the approval of the citizens. The past four years has seen the completion of a number of the League's plans for the improvement of the city. The playgrounds, public baths and school gardens maintained by the League have been taken over by the Public Recreation Commission and are now supported out of the public revenue. The new Charter movement inaugurated four years ago by the League has finally resulted in the choice of thirteen freeholders to be voted upon at the April election. The park area of the city has increased from 2,172 acres to 2,414 acres and the number of parks from 18 to 25. The passage of the law providing for the creation of an outer park system in St. Louis County is practically assured, having passed the lower house of the Legislature by a unanimous vote. The campaign for better street illumination has resulted in the organization of the Down-Town Lighting Association which will have the business section effectively lighted in time for the Centennial Celebration in October. The garbage problem has been satisfactorily and economically solved, the office of City Forester has been created, a comprehensive tenement house law was framed, and has passed both houses of the Municipal Assembly. More than seventy-five addresses and illustrated talks have been given by the League's speakers before the various organizations in the city. Eleven carefully prepared reports, including "Play Grounds," "School Gardens," "Waste Disposal," "Tree Planting," "Street Lighting," "Smoke Abatement," "Housing Conditions," "Public Comfort Stations," "A Year of Civic Effort," "A Year's Work" and "A City Plan for St. Louis," have been printed and distributed by the League. Some twenty-one distinct and separate acts of legislation have been framed, introduced and promoted in the Municipal Assembly, State Legislature or Congress by the different committees. The tangible efforts for civic improvements and the less tangible but just as important influences on public sentiment are the factors which have given the League its present position in the community. This growth, however, has brought with it increased demands and has opened up new fields of work which must be met. In addition to the efforts of the various committees, three important tasks are before the League for the year 1909-10.

1. To keep in touch with the progress of the public improvements planned under the provisions of the $11,000,000 bond issue.
2. To assist as far as possible the thirteen Freeholders in framing and securing the adoption of a Charter adequate to the needs of a rapidly growing city.
3. To initiate and conduct a campaign for the approval by the voters of the city and county of the outer park and parkway system as provided in the bill now before the Legislature.

American Society of Engineering Contractors.—On April 14 and 15, meetings were held at the United Engineering Society Building in New York, at which the permanent organization of the American Society of Engineering Contractors was effected. This new National society begins its career with a membership of nearly 1,500. A constitution was adopted at the meeting on April 15, and officers and directors were elected. "The object of the Society is the advancement of engineering knowledge and contracting practice; the maintenance of a high professional standard among its members and the elimination of those practices and abuses that now exist in the engineering and contracting business, and to strengthen the bond that should exist between engineers and contractors." Corporate members must be engineers, contractors or manufacturers of engineering material or equipment that have been engaged in these lines for at least 7 years, a degree from a college or university of standing counting as 2 years' experience. The constitution also provides for associate members. Officers for the first year were elected as follows: George W. Jackson of Chicago, president; Halbert P. Gillette of New York, first vice-president; D. F. Baxter of New York, second vice-president, and Daniel J. Hauer of New York, temporary secretary. These officers, with the following gentlemen, will make up the board of directors. De Witt V. Moore of Indianapolis, Edward Wegmann of New York and W. D. Lockwood of New York to serve one year; E. S. Hanson of Chicago, George Warren of Boston and J. R. Wemlinger of New York, to serve two years; and Major Cassius E. Gillette of Philadelphia, F. C. Hitchcock of New York and Howard J. Cole of Morristown, N. J., to serve three years. The Society will begin its monthly meetings in the fall. It is already assured of a large membership of eminent engineers and contractors, and sufficient funds to carry on its work. Application for membership can be made to the Temporary Secretary at his office, 721 Park Row Building, New York.

Detroit Society of Civil Engineers.—The following officers were elected April 23: President, F. C. Shenehon, principal assistant engineer, U. S. Lake Survey; vice-president, Ralph Collamore; secretary and treasurer, George H. Fenkell.

Calendar of Meetings

May 5.
Western Society of Engineers.—Regular meeting, 1735 Monadnock Block, Chicago, Ill.—J. H. Warder, Secretary.

May 5.
American Society of Civil Engineers.—Regular meeting at Society House, 220 West Fifty-seventh street, New York.—Charles Warren Hunt, Secretary.

May 6-8.
American Electrochemical Society.—Annual meeting, Niagara Falls, Canada.—Jos. W. Richards, Secretary, Lehigh University, South Bethlehem, Pa.

May 11-14.
Playground Association of America.—Third annual congress, Pittsburg, Pa.—Henry S. Curtis, 705 Ouray Building, Washington, D. C.

May 16-19.
City Marshals and Chiefs of Police of Texas.—Annual convention, Galveston.—Chief J. H. Maddox, Fort Worth, Chairman Executive Committee.

May 18-21.
National Good Roads Congress.—McCoy Hall, Baltimore, Md. Arthur C. Jackson, Secretary, Chicago, Ill.

May 20-22.
Southwestern Electrical and Gas Association.—Annual meeting, Dallas, Tex.—R. B. Stichter, President, Dallas, Tex.

May 25-27.
National Fire Protection Association.—Annual meeting, New York, N. Y.—W. H. Merrill, Secretary, 382 Ohio street, Chicago, Ill.

June 1-4.
National Electric Light Association.—Thirty-second convention, Atlantic City, N. J.—John F. Gilchrist, Engineering Societies Building, 29 West 39th street, New York, N. Y., Secretary.

June 8-12.
American Water Works Association.—Twenty-ninth annual convention, Milwaukee, Wis.—J. M. Diven, Secretary, 14 George St., Charleston, S. C.

June 15-19.
International Association of Police Chiefs.—Annual convention, Buffalo, N. Y. Maj. Richard Sylvester, President, Washington, D. C.

June 22-24.
Municipal League of Indiana.—Annual convention, Lafayette, Ind. J. W. Schooler, Secretary, Lafayette.

June 24-25.
American Institute of Chemical Engineers.—Semi-annual meeting, New York, N. Y.—J. C. Olsen, Secretary, Polytechnic Bureau, Brooklyn, N. Y.

June 28.
American Institute of Electrical Engineers.—Annual convention, Hotel Frontenac, Thousand Islands, Frontenac, N. Y.—R. W. Pope, Secretary, 33 West 39th street, New York, N. Y.

June 29-July 3.
American Society for Testing Materials.—Annual meeting, Atlantic City, N. J.—Edgar Marbury, Secretary, University of Pennsylvania, Philadelphia, Pa.

July 6-9.
American Society of Civil Engineers.—Annual convention, Mount Washington Hotel, Bretton Woods, N. H.—Charles Warren Hunt, Secretary, 220 West 57th street, New York, N. Y.

August 17-20.
International Association of Fire Engineers.—Annual convention, Grand Rapids, Mich.—James McFall, Secretary, Roanoke, Va.

August 25-27.
League of American Municipalities.—Thirteenth annual convention, Montreal, P. Q., Canada.—John MacVicar, Secretary, Des Moines, Ia.

November 9-11.
American Society of Municipal Improvements.—Annual convention, Little Rock, Ark.—A. Prescott Folwell, Secretary, 241 W. 39th St., New York, N. Y.

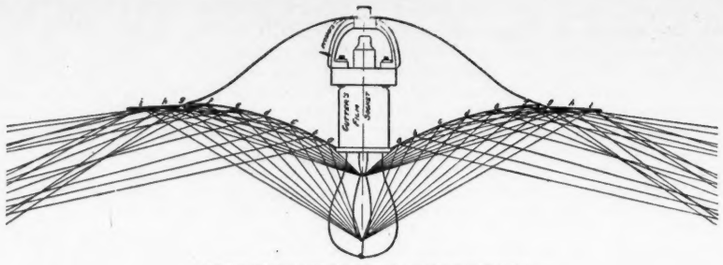
November 15-19.
National Municipal League.—Annual meeting, Cincinnati, O. Clinton Rogers Woodruff, Secretary, 705 North American Building, Philadelphia, Pa.

November 15-19
American Civic Association.—Annual meeting, Cincinnati, O. Richard B. Watrous, Secretary.

MUNICIPAL APPLIANCES

Tungsten Brackets

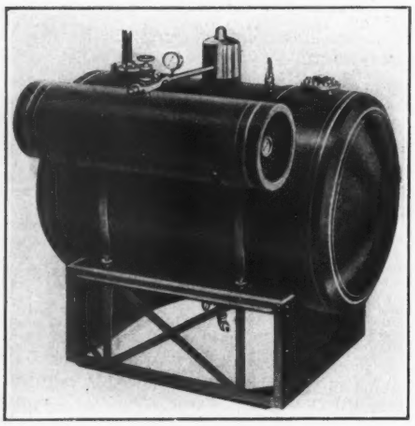
GEORGE CUTTER COMPANY, South Bend, Ind., manufactures special brackets and hoods for tungsten street lamps. The street hoods are made in enamel paint, galvanized and painted, double coat blue fire enamel top, bath tub enamel reflector and copper or zinc. Special merit is claimed for the distribution of light, which is shown in the accompanying cut.



DISTRIBUTION OF LIGHT BY REFLECTOR

Chemical Fire Apparatus

THE Zanesville Chemical Engine Co., Zanesville, O., manufactures "Peerless" fire apparatus of different types, which discharges a chemical claimed to be non-injurious to flesh and fabric, as the more common acid and soda preparations are. The chemical can, it is claimed, be thrown 75 to 100 feet beyond the nozzle with the same pressure for the last gallon as the first. The chemical is also claimed to be more effective than the soda and acid preparation. The accompanying illustration represents the 250-gallon stationary



TANK OF CHEMICAL EXTINGUISHER

chemical engine, designed for installation in the basement of a building, with a standpipe leading to the floors above. The small cylinder shown in the cut contains compressed air, which forces the chemical from the large tank through the pipes. It is claimed that it will throw two streams at a pressure of 125 pounds for a period of eleven minutes. The tank is recharged with air by a triple cylinder pump operated by motor. Tanks are also mounted on wagons of different styles. These include chemical engines, 35 to 200 gallons capacity, combination wagons, hook and ladder trucks, hose wagons.

Ransome Concrete Molds

THE Ransome Traveling Mold for making cement sidewalks and cement curb and gutters has been improved by the addition of a jointing device. The joints are made as follows: The forward cutter is first brought down upon the coarse bottom concrete and worked through it, making a broad cut through the concrete to the ground. It is then withdrawn and by means of a hinged elongated cup the opening formed by the cutter is filled with a cement mortar, which is compacted by one or two blows of the cutter. When by the forward movement of the mold the rear cutter has been brought over this filled cut, it in turn is brought down and worked through it. To the rear cutter jointer strips are attached which form smooth rounded edges on the slabs each side of the cut. The entire operation of cutting takes but a few seconds. The joints are excellent, each slab is entirely separate from the others and adjoining edges are neatly rounded off. The width of the cut can be from 1/16 inch to any greater width desired. Mr. Ransome has also perfected a device for supplying reinforcements without hindering the speed of the work. A sewer pipe molding machine is also his invention.

Crescent Concrete Sewer Pipe

THE Raber & Lang Mfg. Company, Kendallville, Ind., manufactures sewer-pipe machines which can be operated by one man. In operation an iron pallet is placed on the ground, the core is located inside, then the outer casing or shell is placed in position, encircling the core, and securely locked, after which the concrete is tamped into place. After the form has been filled to the top of the core the inside former of the bell end is placed in position and locked with one simple move of the wrist, after which the bell end of the pipe is filled. When this operation is finished the workman, with a turn of the wrist, removes the bell-end former. The core is then released and extracted. Special merit is claimed for the ease and quickness with which the core can be released. In using machines of 24-inch size, two men may be used to advantage in removing cores. The outer shell is removed by releasing the positive patent locks, the shell is swung open on the hinges and removed, one man again being all that is necessary. Crescent machines for making Y-pipe and T-pipe are also manufactured, as well as forms for conduits, culverts, etc.

Concrete Foundations for Pavements

THE use of a Koehring concrete mixer for laying the concrete base for a pavement on Fond du Lac avenue, Milwaukee, Wis., proved very satisfactory to the contractors, Messrs. Donahue and Hoff. The street is 40 feet wide and the mixer was placed in the middle of the street, the whole width of the street being concreted at once. Sand and stone were carefully deposited ahead of the mixer in the proper proportions and location. The cement was delivered at the side of the machine as wanted. The concrete was taken from the mixer in wheelbarrows and spread on the finished grade to a depth of six inches. Work was carried on continuously with a force of about 21 men. Some days the output was considerably over 1,000 square yards. The total labor charge for the work as shown by the pay-roll was 5⅞ cents per square yard. An equally good record was made with the Koehring machine by the Standard Paving Company, in paving a street in Oak Park, Ill. The street was 30 feet wide and the method of procedure was similar, except that instead of taking concrete from the machine with wheelbarrows, it was dumped on a steel plate dragged behind the mixer as it moved forward by its own power and shoveled to place. In this case 26 men, working 10 hours, laid 1,160 square yards of concrete six inches thick. The mixer used in both cases is manufactured by the Koehring Machine Company, 614-615 Germania Building, Milwaukee, Wis. It is their regular machine loaded by a swinging scoop, which rests on the ground.

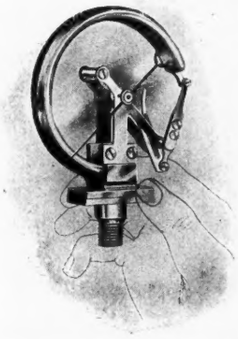
LAYING CONCRETE BASE FOR PAVEMENT—KOEHRING MIXER.

Crescent Continuous Mixer

THE Raber & Lang Mfg. Company, Kendallville, Ind., makes a continuous concrete mixer for use in connection with its sewer pipe molds as well as for general purposes. Mixer No. 1 has a rated capacity of 30 to 35 cubic yards, and No. 2, 65 to 70 cubic yards. The machine is of the hug-mill type, mounted on wheels and has a special measuring device for regulating the proportions of sand, stone or gravel and cement. This proportioner is in the shape of a spool having concave apartments which measure the materials into the mixing trough. A scale is provided on the projecting shaft to adjust the proportioning plug to whatever feed is desired. The mixing paddles are of special design, having a greater surface area than ordinary teeth. They can be adjusted so that the speed of conveying can be accelerated or retarded. Mixers are equipped with International gasoline engines or otherwise, as desired.

Independent Movement for Gauges

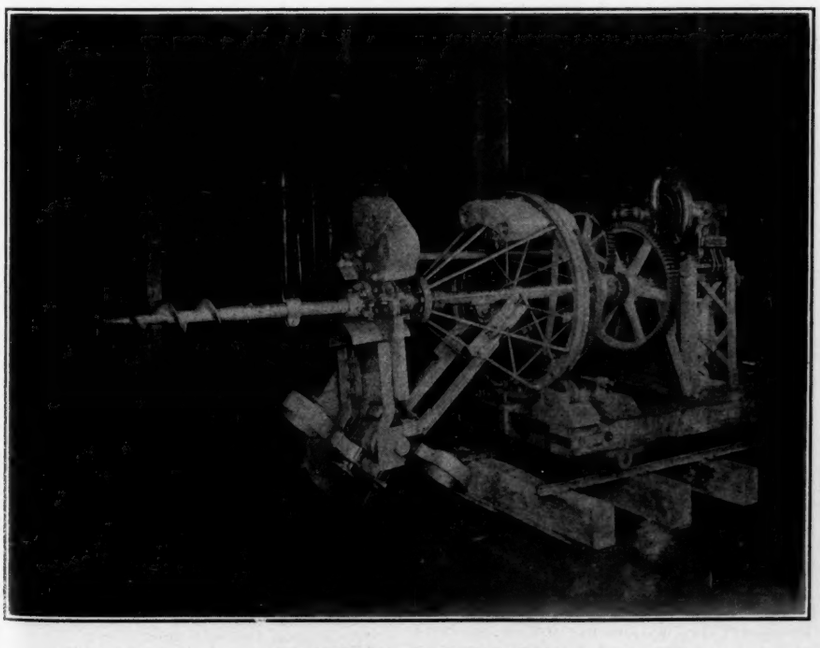
THE Standard Gauge Manufacturing Company, Foxboro, Mass., manufactures a "Model A" gauge, shown in the illustration, the important feature of which is the independent movement.



The working parts, instead of being partly supported by the case and partly by a mounting, as in the old way, are absolutely independent of the case and would operate without the case, which simply serves as a protection. Twisting, jarring or heating of the case, therefore, cannot throw the works out of line or affect the calibration. All parts subject to wear are made out of the best bronze or German silver. The cases of the Standard Gauges may be made of any metal and finished to suit any service. A great variety of sizes, ranges and types have been developed to meet about any conditions of fluid pressure that are known today, and there has been much inquiry from interested parties.

The Ground Mole

THIS name, "The Ground Mole," is applied to an invention of Willis F. Brown, C. E., 850 The Spitzer, Toledo, O., formerly City Civil Engineer, who has been engaged for the past two years as chief inspector on the Detroit River tunnel at Detroit, Mich. The machine is designed for clay cutting and is adjustable to any soil. Its capacity is stated to be ten feet advance per hour in an eight-foot drift, and it may be mounted on an ordinary truck car or be attached to the interior of a shield. When mounted on a truck the machine is easily adjusted to line and grade, also to bores from six feet up to any diameter. This also holds good when the machine is fixed in a shield, except that the alignment is kept by the shield. The machine is adaptable to cylindrical, "egg-shaped" or rectangular drifts and the only change necessary is in the manner of mounting the machine. The entire weight of the machine, including a seven and one-half horsepower compound wound motor, is only two and one-half tons. The machine works automatically, cutting the clay from the breast by a combined transverse and longitudinal revolution of the knives. The transverse motion is controlled according to the section to be taken out. The excavated material, which falls to the bottom or invert, is picked up by an ingenious mechanical arrangement and carried by belt conveyor to the rear, where it is deposited in a receptacle for removal. The machine is the result of several years of study and actual contact with tunneling methods, its simplicity and automatic principle, combined with its strength and positive action, being highly endorsed by prominent engineers and contractors. Patents are now pending.



MACHINE FOR BORING IN EARTH

TRADE NOTES

Cast Iron Pipe.—Chicago: Quite a number of large orders have been placed and there is a gratifying increase in small orders and inquiries. Quotations: 4-inch, $27.50; 6 to 12-inch, $26.50; 16-inch and up, $24.50. Birmingham: Small orders for Southern municipalities are larger in the aggregate than for some weeks, and recent bond issues indicate improvement.

Lead.—Market is firm and there is a fair volume of trade. New York Metal Exchange price firm, at 4.20 and 4.25 cents. The American Smelting and Refining Company's price is 4.20 cents. St. Louis market firm, at 4.10 to 4.15 cents. London: Soft Spanish, £13 5s, and English, £13 15s.

Asphalt Company Report.—The General Asphalt Company's report for the fiscal year ended January 31, 1909, shows net earnings of $1,027,130 and a net surplus for the year of $871,704, or more than 6 1-2 per cent on the $13,000,000 preferred stock. Owing to the business depression the volume of business fell off $3,329,136, compared with the previous year, the total being $11,818,528, but by economy in operation this loss was turned into a net gain of $161,579. A dividend of 1 per cent was paid last September on the preferred stock, and a quarterly dividend of 1 1-4 per cent on March 1. The working capital is now the largest in the company's history. It amounts to $4,640,279, a gain for the year of $305,000. During the year the company constructed about 2,850,000 square yards of private and public work and pay repairs. Since its organization the company has laid an area of paving equal to about 1,100 miles of road, 26 feet wide, a strip long enough to reach from Boston to Kansas City. The General Asphalt Company controls the Barber Asphalt Paving Co., the New York & Bermudez Co., the new Trinidad Lake Asphalt Co., Ltd., and the Uintah Railway Company, which reaches the gilsonite mines in northeastern Utah. The report discusses the settlement made with Venezuela since Castro ceased troubling. The company has paid about $60,000 in settlement of the fine of $5,000,000 imposed by the former President of that republic, and has obtained express recognition of its title to all its lands and mining rights. Hereafter the company will pay an export tax of 4 bolivars, or about 80 cents, a ton on asphalt, instead of the old rate of about 40 cents.

Pumping Engines.—The Luitwieler Pumping Engine Company, of Los Angeles, Cal., is to move its business to Rochester, N. Y., according to information given out at the Rochester Chamber of Commerce by Secretary Roland Woodward. The company has been investigating conditions in Rochester for a year, with the idea of moving there, and now the building of the American Laundry Machine Company at Lincoln Park has been purchased by the Los Angeles concern. The number of men employed by the company is said to be 300. In 1903 the company was incorporated under the laws of California with a capital of $200,000. The inventor of the pumping engines, which may be operated by electricity, steam or gasoline, is S. W. Luitwieler, president of the company, who is a brother of P. T. and J. H. Luitwieler, of Rochester, members of the firm of Jacob G. Luitwieler & Sons, Rochester. The Chamber of Commerce reports that it is a "going and growing concern."

Sewer Rods.—F. Bissell Company, Toledo, O., manufactures sewer rods under the trade name "Security." The rods are made in standard lengths of three and four feet, specials being made to order. They are of hickory with iron sockets, easily jointed and unjointed, but firmly held together and easily uncoupled. No rivets are used. The hickory rods are driven into the sockets and spread by iron wedges. The sockets have perforations on their sides permitting an examination of the connection and also allowing the wood to swell out into the perforations, increasing their grip wonderfully.

Sewage-Controlling Appliances.—Merritt & Co., Camden, N. J., manufacture appliances of various kinds used in sewerage systems and sewage disposal plants. Their sewage ejector for raising sewage from low levels operates by compressed air without the use of a float. The advantages claimed for this device are: Reliability, efficiency, durability, economy and simplicity. Their automatic air-lock siphons for flush tanks have a special pilot pipe through which air can pass, but liquid cannot. The advantages claimed are positive and permanent reliability, rapid make and break of vacuum, and high cleaning velocities. In sewage disposal plants the automatic air-lock method of control, operated with moving parts and thus unaffected by the corrosive properties of sewage, is proving of great assistance in the practical application of the processes of sewage purification.

Reinforced Concrete Sewer Design.—The Corrugated Bar Company (formerly the Expanded Metal and Corrugated Bar Company), National Bank of Commerce Building, St. Louis, Mo., in Bulletin No. 7, discusses special problems met with in the design of sewers and conduits. Detailed designs of an aqueduct, sewer section and pressure pipe are also presented. The formulas proposed are based upon a concrete with a compressive strength of 2,000 pounds per square inch and upon the use of mechanical bond reinforcing bars which have an elastic limit of 50,000 pounds per square inch. The design of a rectangular conduit, an aqueduct 4 feet deep by 8 feet wide, with distance from center to center of supports is first considered and formulas worked out for the reinforcement. The care of circular sewers is then considered. Stresses in circular sections due to the surrounding fill cannot be accurately determined. Not only does the active pressure exerted by the fill vary widely for different materials, but the pressures due to any given material change both in direction and amount with its condition. The discussion given is to assist the designer in determining the probable limits of the stresses. In designing pressure pipes the steel reinforcing bands are figured to carry all the tensile stresses due to the pressure of the water, the concrete being considered as a filling-in material.

Mammoth Gas Meter.—The Luzerne Gas and Electric Light Company, Wilkes-Barre, Pa., received a mammoth gas meter to be installed at the Matheson Motor Car Company's plant at Dorranceton. The meter stands over four feet high and measures three feet in width, and will supply 150 lights. The meter resembles an ordinary safe, and is the largest ever installed by the company, having a registering capacity of ten million cubic feet.

Hydro-Electric Plant.—The Oswego County Light and Power Company, Oswego, N. Y., has petitioned the Public Service Commission for authority to increase its capital stock $100,000, the increased capital to be used for the development of a hydro-electric plant at Salmon River Falls. The company's engineer estimates that about 15,000 horsepower can be developed. The company is not yet ready to take up the construction work, and it will probably be two or three months before it will have its plans and specifications ready. Henry D. Brewster, of Syracuse, is president.

Railway Consolidation.—Approval has been given by the Public Service Commission to an agreement of consolidation by the Syracuse, Geneva & Corning Railway Company, the Fall Brook Railway Company and the Pine Creek Railway Company. The consolidated company is to be known as the Geneva, Corning & Southern Railroad Company. Its corporate existence is to be 999 years, and its principal office is to be located in Albany. The capital stock of the consolidated corporation is $7,325,000, of which $5,000,000 shall be preferred stock, preferred both as to dividends and in the distribution of assets, and entitled to cumulative dividends at the rate of 4 per cent per annum from April 1, 1909. The amount of common stock is $2,325,000. The railroads consolidated connect the main line of the New York Central at Lyons, and the Philadelphia & Reading Railroad at Williamsport, Pa., and with branches from Dresden to Penn Yan, and from Lawrenceville to Ulysses, Pa. The three lines have been leased to the New York Central for 999 years.

Gas Company Sold.—The sale has been announced of the Haverhill, Mass, Gas Company by P. J. Nevins, general manager of the company. The latter will remain in charge of the company for the new owners and no changes will be made in the management or policy of the company. Negotiations for the purchase of the plant have been under way for some time past, and it is understood that Stone & Webster, of Boston, are the purchasers, although Mr. Nevins says he does not know who the new owners are. The sale was effected through Receiver Reynolds of the firm and E. H. Gay & Co., of Boston, the latter concern having floated the bonds of the Haverhill Securities Company, the holding concern, when the company was sold 10 years ago. The gas company is one of the oldest in the State, and until its sale, 10 years ago, was owned entirely by local people. It was sold at that time for $375,000, and $500,000 in bonds were floated by the holding company. The purchase price in the present sale is withheld. The new owners will assume the case brought by the company in its appeal from the decision of the State Gas Commission, ordering an 80-cent rate in Haverhill, the present rate being $1. Mr. Nevins also announced that the new company, of which he is the organizer, intends to begin the construction of a plant that will supply the towns of Whitman, Abington, Rockland and Weymouth next month. An outlay of $500,000 is contemplated in the construction of the plant, with 70 miles of gas mains, the company intending to later supply the towns of Braintree and Hingham. Work will be begun next month.

Jail Cells.—Judge F. D. Sampson, Barbourville, Ky., wants prices on cells and jail supplies and fixtures.

Fire Hose.—The Eureka Fire Hose Manufacturing Co., 13 Barclay street, New York, has written the following letter: "On April 13, about 5.05 p. m., we received a telephone message requesting us to ship 5,000 feet of Paragon fire hose, complete with couplings, at $1 per foot, by express. Notwithstanding the fact that our works closed at 6 p. m., by running departments overtime we shipped the entire 5,000 feet on the New York Central Express leaving Grand Central Station at 11.45 p. m. It was necessary to thread 100 sets of couplings, attach them to the hose, and then haul the hose from our works in Jersey City to 47th street and Madison avenue, New York, to the American Express receiving station. A universal thread adopted by all Fire Departments would be a great thing, as with the volume of business we are doing we could carry several thousand sets on hand, and would be able to ship a large quantity in an emergency a few hours after receipt of order.

LOW BIDS RECEIVED FOR SEWER CONSTRUCTION AT BALTIMORE, MD.

Material	Size of Pipe, Inches	Price
No sewer†	66	$18.00
" " "	60	39.00
" " "	30	9.75
Sewer brick masonry	..	16.00
Vitrified brick masonry	..	21.00
Class A concrete	..	8.50
" B "	..	8.00
Pipe underdrain	12	1.00
" "	10	1.00
" "	8	.75
Pipe house connection	6	3.00
" " "	8	4.00
No sewer†	66 x 84	22.75
" " "	114	6.60
" " "	66	1.80
" " "	60	2.40
" " "	42	3.50
" " "	36	1.60
" " "	33	1.30
" " "	30	1.30
" " "	24	1.30
" " "	20	.87
" " "	18	.83
" " "	15	.73
" " "	12	.57
Brick	42	6.65
Concrete	42	5.48
Reinforced concrete	42	7.00
Brick	36	5.71
Concrete	36	4.22
Brick	33	5.23
Concrete	33	3.42
Brick	30	4.80
Concrete	30	3.00
Clay pipe	24	1.60
" "	20	1.25
" "	18	1.00
" "	15	.90
" "	12	.65
Underdrain	6	.50
Underdrain*	8	.60
Cast iron pipe	30	12.00
" " "	20	5.80
" " "	6	1.05
" " "	4	.65
Underdrains	20	2.26
"	15	1.25
"	12	1.32
"	10	.95
No sewer†	60	15.50
" " "	57	13.50
" " "	55	15.00
Sewer brick masonry	..	13.00
Vitrified " "	..	23.00
Concrete A "	..	8.25
" B "	..	7.75
Clay pipe	6	2.00
" "	8	2.00
Cast iron pipe	6	3.00
" " "	8	3.00
No sewer†	52	13.00
" " "	48	11.25
" " ‡	45	11.25
Sewer brick masonry	..	15.00
Vitrified " "	..	23.00
Concrete A	..	8.00
" B	..	7.75
Underdrain	10	.60
"	8	.50
Clay pipe house connections	6	2.00
Cast iron house connections	8	2.00
" " " "	6	3.00
" " " "	8	3.00

*Rock excavation, $4.50 per cu. yd. extra.
†Excavation and refill only.
‡Rock excavation, $5.00 per cu. yd. extra.

LOWEST BIDS FOR SEWER CONSTRUCTION

City	Material of Sewer	Depth of Trench	Nature of Excavated Material	Size Pipe	Price per lin. ft.	Mean of All Bids	Manholes		Miscellaneous
							Depth	Price	
Sandusky, O.	Parmley reinforced	10′	Loose rock	18″	$1.45	$2.00	6′–10′	$30.00	Replaces 12″ pipe. Some ground water.
	D. S. clay pipe	7′		12″	2.10	2.15	6′–10′	30.00	Wages $1.75 per day. Some ground water.
		6′		10″	2.00	2.10	6′–10′	30.00	Wages $1.75 per day. Some ground water.
New London, Conn.	Clay pipe	6′ 7″		30″	4.07				
		6′ 7″		24″	2.28				
	Wood pipe, built	6′ 7″		28″	2.42				
	laid	31′		28″	4.81				No water.
Santa Cruz, Cal.	Clay pipe	5′	Hardpan and loam	6″	.32		4′–5′	29.36	Wages $2.00 per day.
				8″	.4025				
				10″	.5475				
				12″	.7725				
East St. Louis, Ill.	Concrete			4′	9.25				
				4.5′	10.80				
				5′	12.50				
				5.5′	13.50				
				6′	14.25				
				6.5′	16.25				
				7′	19.00				
				8.5′	25.00				
				9.5′	27.07				
				10′	25.50				
				10.5′	26.35				
	Reinforced concrete			10.5′	35.00				
	Clay pipe			3′	8.30				
Toronto, Canada	Concrete			7.5′ to 8.5′	23.75				
	Brick			7.5′ to 8.5′	33.13				
Miami, Fla.	Concrete	8.7′		24″	3.64				Rock, $1.78 per cu. yd. extra. Wages $1.50 per day.
	Cast iron			°24″	4.04				
	Clay pipe			6″	1.45				
Portsmouth, O.			Earth	8″	.25			25.00	Excavation 20c. per sq. yd extra.
Pittsburg, Pa.		8′		15″	.83		12′	40.00	
		9′		12″	.85		10′	30.00	
		11′		10″	.88		15′	50.00	
	Brick	13′		42″	6.00				
	Clay pipe	12′		24″	3.74				Asphalt pavement.
		15′		20″	3.35				Stone block pavement.
Auburn, N. Y.				10″	.40				
				8″	.30				
				5″	.23			25.00	Rock $2.00 per sq. yd. extra
Galion, O.			Earth	12″ or less	.07				Labor only. Pipe 80.5% off list price. Excavation, 50 cents per sq. yd.
				18″ or less	.09				
Cherokee, Iowa	Pipe	7′–10′	Clay and gravel	6″	1.26				
Elgin, Ill.	Rein. concrete			35″x52.5″	8.00			35.00	
	Concrete			35″x52.5″	4.00				
	Pipe			24″	1.84				
				18″	1.15				
				15″	1.13				
				12″	.83				
				10″	.70				
				8″	.50				
				8″	.50				
				6″	.35				
Sioux City, Iowa	Pipe	12′–15′		8″	.445		9′–17′	34.75	
				10″	.545				
				12″	.645				
Columbus, Wis.	Clay pipe	7′	Clay	6″	.35			29.00	Ground water.
		8.5′		8″	.49				
		18′		10″	2.28				
		6′		6″	.61				
Redondo Beach, Cal.	Cast iron pipe	4′		10″	1.60				
	Clay pipe	4′		16″	.80				
Brighton, Mass.				69″x72″	5.75				Excavation and refilling.
				72″x48″	4.45				
	Brick				14. cu. yd.				Rock excavation, $4 extra.
	Concrete				6.70 cu. yd.				
Galveston, Texas		6′	Quicksand	66″x35″ rect.	6.20	6.90		13.75	Covered, 8″.
					3.75	4.88			Open.
					10.12	9.28			Heavy covered, 11″.
					5.28	6.33			Open.
Mt. Carmel, Ill.	Pipe			6″	.10			40.00	
				8″	.15				
				10″	.20				
				12″	.25				
	Cast iron pipe			12″	1.40				Trenching av. cut., 8 ft., 35c
Hallock, Minn.	Clay pipe	30′		15″	.75				
Plainfield, N. J.		6′–8′	Clay	8″	.52	.85	8′	40.00	Wages, $1.50 per day.
	Cast iron pipe	6′–8′	Gravel	8″	1.25				
Merrill, Wis.	Pipe		Sandy loam	12″	.85		10′	38.00	
Waterloo, Iowa		0′–6′		0′–6′	.15				Trenching and back filling.
		6′–8′			.23				
		8′–10′			.48				
		10′–12′			.79				
		12′–14′			1.04				
		14′–16′			1.46				
	Clay pipe			5″	.07				Trenching and laying.
				6″	.09		0′–8′	36.50	
				8″	.14		8′–10′	43.00	
				10″	.21		10′–12′	49.75	
				12″	.28		12′–14′	56.00	
				15″	.42		14′–16′	62.75	
				18″	.54				
				20″	.75				Rock excavation, $3 extra.
North Manchester				6″ to 15	.99				
Valley City, N. D.		8′		10″	.80				
West Allis, Wis.	Brick			30″	3.18				
	Pipe			24″	1.50				
				22″	1.39				
				20″	1.20				
				18″	1.10				
				15″	1.00				
				12″	.90				
				10″	.80				

THE WEEK'S CONTRACT NEWS

Relating to Municipal and Public Work—Street Improvements—Paving, Road Making, Cleaning and Sprinkling—Sewerage, Water Supply and Public Lighting—Fire Equipment and Supplies—Bridges and Street Railways—Sanitation, Garbage and Waste Disposal—Police, Parks and Miscellaneous—Proposals and Awards

To be of value this matter must be printed in the number immediately following its receipt, which makes it impossible for us to verify it all. Our sources of information are believed to be reliable, but we can not guarantee the correctness of all items. Parties in charge of proposed work are requested to send us information concerning it as early as possible; also corrections of any errors discovered.

BIDS ASKED FOR

STATE	CITY	RECEIVED UNTIL	NATURE OF WORK	ADDRESS INQUIRIES TO
		STREET IMPROVEMENTS		
New York	Buffalo	May 6	Paving Columbus ave.; repaving R. I. st. and Columbus alley	F. G. Ward, Comr. Pub. Wks.
Indiana	Brazil	May 6, 11:30 a.m.	Bldg. 8,700 ft. gravel road, Sugar Ridge twp.; 13,416 ft. Harrison twp	Jas. L. Burns, County Auditor.
Pennsylvania	Chester	May 6, 10 a.m.	Laying brick, asphalt or concrete pavement on bridge	Geo. W. Allen, Chm. Co. Comrs.
Indiana	Bluffton	May 6	Constructing 6 gravel roads	County Auditor Wells County.
Pennsylvania	Media	May 6, 10 a.m.	Laying brick, asphalt or concrete paving on bridge	H. M. Marquis, City Clerk.
Ohio	Youngstown	May 6, noon	Improving Ridge Ave	W. H. McMillin, Clk. Bd. Pub. Serv.
Indiana	Rushville	May 6, 2 p.m.	Constructing macadam road	Jesse M. Stone, County Auditor.
Pennsylvania	New Brighton	May 6, 7 p.m.	Vit. brick paving, 1,430 sq. yds.; hillside block, 1,956; grade 1,300 yards	Town Council.
Indiana	Fort Wayne	May 6, 7:30 p.m.	Paving 2 alleys	W. H. Becker, City Clerk.
Virginia	Portsmouth	May 6, 8 p.m.	Furnishing 140,000 sidewalk paving brick; 6 samples by Apr. 30; price per M., f.o.b. cars or wharf	Bascom Sykes, City Engineer.
Ohio	Mt. Gilead	May 7, 11 a.m.	Bldg. No. Bloomfield stone road Improvement No. 1	W. C. McFarland, County Auditor.
Maine	Ft. Williams	May 7	Grading and road work	Capt. F. J. Morrow, Q.M.
Indiana	Fowler	May 7	Bldg. 6 miles of County road between Benton and Jasper Cos	Benton County Commissioners.
Ohio	Cincinnati	May 7, noon	Repairing road Springfield twp., spec. 823; $10,000 bond	Stanley Struble, Pres. Co. Comrs.
Ohio	Logan	May 7, 1 p.m.	Grading and macadamizing 3,000 ft. of road	James L. Martin, Co. Auditor.
Indiana	Vincennes	May 7, 2 p.m.	Curbing and paving sidewalks on Barnet St.	C. L. V. Tucker, Clk. Bd. Pub. Wks.
Kansas	Junction City	May 7, 3 p.m.	Bldg. cement curb and gutter, W. 9th St	J. G. Pease, City Clerk.
New Jersey	Roselle Park	May 7, 8 p.m.	Bldg. 1,300 sq. yds. 6-in. macadam; 275 cu. yds. excav., etc.	J. Wallace Higgins, Boro. Engr.
Indiana	Winamac	May 7	Bldg. system of macadam roads Rich Grove twp	Ellis S. Rees, County Auditor.
Wisconsin	Racine	May 8, 10 a.m.	Constructing 243 ft. cement curbing	P. H. Connolly, Chm. Bd. Pub. Wks.
New Jersey	Basking Ridge	May 8, 11 a.m.	Bldg. stone road in Bernardsville for Township Com	J. B. Kronenberg, Clk. Bernard. twp.
Oregon	Toledo	May 8	Improving, 4 to 8 miles of County road	County Commissioners.
Ohio	Cleveland	May 8, 11 a.m.	Grading, draining, etc., Cannon road, Ledge Hill	Wm. F. Black, County Comr.
Indiana	Spencer	May 8, noon	Constructing 5 macadam roads, 32,448 ft. long	Geo. W. Edwards, County Auditor.
Ohio	Youngstown	May 8, 1:30 p.m.	Grad. Belle Vista ave., 2,753 ft. long. & bldg. stone retain. wall	E. D. Haseltine, Eng., 1818 Wilson av.
Wisconsin	Fond du Lac	May 8, 3 p.m.	Bldg. cement pavements, curb and gutter, 2 streets	E. P. Fitzgerald, Clk. Chm. Bd. Pub. Wks.
Iowa	Cresco	May 10, 8 p.m.	Brick paving on concrete, 9,000 sq. yds.; cement curb, 3,000 ft.	City Clerk.
South Dakota	Aberdeen	May 10, 8 p.m.	Brick, asphalt, creo. block, macadam, several sts	F. W. Raymond, City Auditor.
Pennsylvania	McKees Rocks	May 10, 8 p.m.	Paving, 17,000 sq. yds.; grading, 5,000 cu.yds; curb, 10,000 lin.ft.	George H. McGinness, Boro. Engr.
New Hampshire	Concord	May 10, 5 p.m.	Surfacing with trap macadam in E. Kingston and Salem	A. W. Dean, State Engineer.
Maryland	Huntington	May 10, 9 a.m.	Bldg. Giltner County road between Wayne and Polk twps	John W. Weaver, County Auditor.
New York	Cortland	May 10, noon	Crowning Myrtle ave. and resurfacing with gravel	S. Allen Mead, Town Clerk.
Indiana	Huntington	May 10, 9 a.m.	Bldg. gravel road for county	J. W. Weaver, County Auditor.
Pennsylvania	DuBois	May 10, noon	Vit. brick or asphalt block paving, etc., 97,300 sq. ft., 3 sts	J. C. Weaver, Sec'y Boro. Council.
New York	No. Tonawanda	May 10	Paving Vandervoort st., estimated cost, $33,000	A. P. Smith, City Engineer.
Rhode Island	Fort Mansfield	May 10, 10 a.m.	Bldg. concrete roads and resurfacing macadam	Capt. Chas. T. Baker, Watch Hill P.O.
Ohio	Columbus	May 10, noon	Brick or block, asphalt, etc., paving, 4 sts.; repaving 1 st	E. W. Hirsch, Sec'y Bd. Pub. Serv.
Ohio	Steubenville	May 10, noon	Paving and curbing Lake Erie ave	H. G. Simpson, Clk. Bd. Pub. Serv.
Iowa	Des Moines	May 10, 10 a.m.	Paving West 5th st. with asphalt	G. F. Poorman, City Clerk.
Ohio	Lakewood	May 10, 11 a.m.	Labor and material for paving Lakewood ave. and Davis Court	Wm. H. Evers Engr. Co., Arcade, Clvd.
Iowa	Bedford	May 10, 11:30 a.m.	Paving 3 streets with vitrified blocks	E. L. Price, City Clerk.
Connecticut	Hartford	May 10	Grading, drives, walks, bridges, etc., at New State armory	Henry Roberts, Chm. Armory Com.
Connecticut	New Haven	May 10	Granite block paving, Chapel, Crown and Fair sts	C. W. Kelly, City Engr.
Connecticut	Waterbury	May 11	Paving, any material, 7,025 sq. yds., Grand and E. Main sts	R. A. Cairns, City Engineer.
Virginia	Petersburg	May 11	Bldg. 6 miles gravel road on Halifax rd. and 5 miles on Plank rd	Charles T. Lassita, Road Board.
Georgia	Augusta	May 11, noon	Const. 8,300 sq. yds. vit. brick; 8,000 yds. Belgian block or granitoid paving; 1,700 lin. ft. granite curb, 4 sts	Nisbet Wingfield, City Engineer.
Ohio	Bucyrus	May 11, noon	Macadamizing and piking Broken Sword Road	J. I. Smith, County Auditor.
Wisconsin	Beloit	May 11, 10 a.m.	Constructing standard sidewalks for ensuing year	Jos. L. Hendley, Chm. Bd. Pub. Wks.
Pennsylvania	Philadelphia	May 11	Abolishing grade crossings in city	W. Hunter, Ch. Engr. P. & R. Ry. Co.
Wisconsin	Cambridge	May 11, 7:30 p.m.	Constructing cement curb and gutters for year	O. J. Olson, Village Clerk.
New York	Fredonia	May 11, 7:30 p.m.	Paving Railroad ave with vitrified shale brick	Harry B. Espy, Village Clerk.
New Jersey	Freehold	May 12	Bldg. gravel road, Millstone twp	Wm. B. Conover, Dir. Bd. Freeh'drs.
Alabama	Mobile	May 12, noon	Creo. wood block paving, 90,000 sq. yds.; cement curb, 60,000 ft.	Wright Smith, City Engineer.
Ohio	Cleveland	May 12, 11 a.m.	Grading, draining, improving Warner road	Wm. F. Black, Clk. Co. Comrs.
Indiana	Tipton	May 12, 10 a.m.	Bldg. gravel road on line between Tipton and Clinton Counties	J. F. Barlow, County Auditor.
Ohio	Toledo	May 12, 10 a.m.	Repairing Stone Roads Nos. 33, 7 and 25, macadam, etc	D. T. Davies, Jr., County Auditor.
Ohio	Columbus	May 12, noon	Furn. material and macadamizing National road	John T. Scott, County Auditor.
New York	Brooklyn	May 12, 11 a.m.	Asphalt paving, 29,850 sq. yds.; asphalt block, 5 yr. guar., 7,240 sq. yds.; granite, 3,500 sq. yds.; cement curb, etc., 19,290 ft.; cement sidewalks, 23,460 sq. ft.	Bird S. Coler, Boro. President.
New York	Rye	May 12, 8 p.m.	Laying 8,600 lin. ft. curb with brick gutters, 250 ft. 12-in., 1,400 ft., 8-in. sewer pipe, 13 catch basins	Geo. L. Henderson, Village Clerk.
New Jersey	Smithburg	May 12	Bldg. 1 mile gravel road in Millstone twp	Geo. W. Patterson, Jr., Clk. Bd. Frhd.
Ohio	Paulding	May 14, noon	Grading, draining, culverting, macadamizing, 228,084 lin. ft., 12 sections, 6 roads, inc. stone approaches	C. L. Straw, County Engineer.
Indiana	Lafayette	May 15, 10 a.m.	Bldg. gravel road, petitioned for by D. A. Buck, et. al	John P. Foresman, County Auditor.
Ohio	Cleveland	May 15, 11 a.m.	Grading, draining, etc., Mayfield road No. 2	Wm. F. Black, Clk. Co. Comrs.
South Dakota	Ashton	May 15, noon	Regrading, 5 miles road; grading, 10 miles new road	O. B. Olson, Clk. Bd. Supervisors.
Indiana	Marion	May 15, 2 p.m.	Bldg. gravel road 5,395 ft. long, in Monroe township	A. Y. Stout, County Auditor.
Missouri	St. Charles	May 15, 8 p.m.	Constructing 38,768 sq. ft. of granitoid sidewalk, 10,415 lin. ft. curb and gutter	Carr Edwards, City Engineer.
Virginia	Roanoke	May 17, noon	Improving two streets	R. H. Wills, City Clerk.
Ohio	Bowling Green	May 17, 1 p.m.	Grading, draining, macadamizing, 2 roads, 3 1-2 and 2 3-4 miles	J. F. Gallier, County Auditor.
Ohio	Jefferson	May 17, 1 p.m.	Bldg. 5 miles brick or macadam road, Marroe twp	E. C. Remick, County Auditor.
Indiana	Greencastle	May 17, 2 p.m.	Constructing macadamized road in Green twp	D. V. Moffett, County Auditor.
Indiana	Rushville	May 17, 2 p.m.	Bldg. macadam road between Parke and Putnam Counties	H. A. Henderson, County Auditor.
West Virginia	Bramwell	May 17	Paving and curbing streets	J. A. Waddell, Mayor.
Virginia	Fort Monroe	May 17, 10 a.m.	Bldg. macadam roads, concrete walks, brick gutters	Capt. E. R. Tilton, Q. M.
Wisconsin	Menasha	May 18, 7:30 p.m.	Bldg. concrete pavement one street	D. McMahon, Chm. St. Com.
Manitoba	Winnipeg	May 20, 11 a.m.	Laying 49,672 sq. yds. asphalt pavement	M. Peterson, Sec'y Bd. Control.
Wisconsin	Lake Mills	May 20, 8 p.m.	Laying 22,200 sq.yds.asphalt macadam, 8,000 ft.curb and gutter	W. G. Kirchoffer, Engr., Madison.
North Carolina	Wilmington	May 20	Furn. crushed stone and granite curb	W. E. Springer, Mayor.
Oregon	Ranier	May 20, 8 p.m.	Improving streets in districts Nos. 1 and 2	J. B. Doam, Police Judge.
Ohio	Cleveland	May 21, 11 a.m.	Improving E. Lake road	W. F. Black, Clk. Bd. Co. Comm.
Ohio	Cardington	May 21, 11 a.m.	Constructing road improvement	W. C. McFarland, County Auditor.
Ohio	Paulding	May 21, noon	Grading, draining, macadamizing, etc., 50 miles pike, 10 sections; estimated to cost $171,000; C. L. Straw, Engr	Floyd Atwill, County Auditor.
Ohio	Mt. Gilead	May 21	Bldg. Cardington Rd., 1 1-2 miles; also 3 1-4 miles, Gilead rd	W. C. McFarland, County Auditor.
Ohio	Westerville	May 22, noon	Grading and paving brick or other material, curb, 2 streets	Ellsworth Horlocker, Village Clerk.
Ohio	Cleveland	May 24, 11 a.m.	Improving Irish road	W. F. Black, Clk. Bd. Co. Comrs.
Kentucky	Louisville	May 24, noon	Bldg. undergrade crossing in Oak st.; 20,000 cu. yds. excav.; 2,300 cu. yds. concrete; 2,000 sq. yds. granite paving	Alex. G. Barret, Chm. Bd. Pub. Wks.
New Jersey	New Brunswick	May 26	Paving 28,000 sq. yds, any material; curb, 7,500 ft	John T. Kemp, Street Comr.

BIDS ASKED FOR

STATE	CITY	RECEIVED UNTIL	NATURE OF WORK	ADDRESS INQUIRIES TO
STREET IMPROVEMENTS—Continued				
New Jersey	New Brunswick	May 26	Bldg. stone and gravel roads for county	Bd. of Chosen Freeholders.
Ohio	Cincinnati	May 27	Extending Hillside ave. in Delhi Twp.	Bd. of Co. Comm'rs.
Ohio	Cincinnati	May 28, noon	Treating Salem Pike with Tarvia	Stanley Struble, Pres. Bd. Co. Com.
Ohio	Columbus	May 28	Macadamizing bridge approach and treating with tarvia	F. M. Sayre, County Auditor.
Indiana	Elkhart	May 30	Paving Princeton st. 7,000 sq.yds. and 1 1-4 miles on Franklin st. with asphalt, brick, wood block or asphalt block	City Clerk.
Florida	Pensacola	June 1, noon	Paving 170,700 sq. yds. with clay or shale blocks, sheet asphalt, bitulithic, wood block or macadam pavement and constructing 115,950 linear ft. concrete curb	R.M.Bushnell,Chm.Bd.of Bond Trus.
North Dakota	Carrington	June 1	Grading roads	W. H. Searl, Clk. Bd. Supervisors.
Ohio	Piqua	June 1	Bldg. 14,000 sq. yds brick, 10,000 brick or macadam	Board of Public Service.
WATER SUPPLY				
Illinois	Oak Park	May 6	Furn. and laying c. i. water mains, valves, hydrants, etc	R. A. Carpenter, Comr. Pub. Wks.
Massachusetts	Boston	May 7	Laying 5,900 ft. 30-in. and 2,000 ft. 12-in. pipe in Sleeper st., etc.	Wm. E. Hannan, Water Comr.
Maine	Portland	May 7, 10 a.m.	Extending sewer and water mains, etc., at 2 forts	Capt. F. J. Morrow, U. S. Army.
Georgia	Augusta	May 10, noon	Furn. 105 tons 6-in.; 33 tons 8-in.; 96 tons 10-in; 25 tons 12-in. c. i. pipe with specials; 7,000 ft. 2-in. galvanized pipe	Nisbet Wingfield, Comr. Pub. Wks.
Wisconsin	Waukesha	May 10, 2 p.m.	Constructing 3 1-2 miles of water mains	O. P. Clinton, Chm. Bd. W. Com'rs.
North Dakota	Grand Forks	May 10, 4 p.m.	Constructing water mains, 3 sts.; $500 check each job	W. H. Alexander, City Auditor.
South Dakota	Plankinton	May 10, 8 p.m.	Material and labor for constructing complete w. w. system	E. F. Mackey, City Auditor.
Texas	Denison	May 10, 8 p.m.	Constructing earth dam; 145,000 cu. yds. embankment	Alex. W. Acheson, Mayor.
Texas	Greenville	May 11, noon	Furn., erecting,etc., com. cond. crank and fly-wheel pump. eng.; brass tube surface condenser complete with air-pump, vacuum gauge, etc., for operating same	J. W. Maxey Co., Engrs., Houston.
Michigan	Detroit	May 11, 3:30 p.m.	Furn. 11,000 1-in. and 4,000 5-8-in. corporation cocks	B. F. Guiney, Water Board.
Texas	Galveston	May 12, noon	Bldg. 8-in. c. i. pipe across ship channel, inc. 1,500 ft. submerged pipe, 42 in. below low tide, requiring 35,200 cu. yds. dredging; also 12,500 ft. shore pipe	A. T. Dickey, City Engineer.
Indiana	Muncie	May 15	Bldg. compression system of water works at County bldgs.	Jos. E. Davis, County Auditor.
New York	New York	May 17, 3 p.m.	Furn. and install.two 12,500,000-gal.steam turbo turbine pumps, two 225-h.-p. water-tube boilers, Jerome ave. station	Board of Water Supply.
Colorado	Lamar	May 17	Bldg. section 2, pipe line from intake to reservoir, 9 miles; also for bldg. concrete reservoir	C. W. Heaton, Town Clerk.
Alberta	Lethbridge	May 17	Furn. steam pump, capacity, 2,000,000-gal. 24 hours	Smith, Kerry & Chace, Confederation Life Bldg., Toronto, Ont.
Ontario	Toronto	May 18, noon	Material and labor for works in con. with water filtration plant.	Joseph Oliver, Chm. Bd. Control.
Saskatchewan	Estevan	May 19	Bldg. w. w. sys. and main sewer, inc. 7,300 ft. w. main.; 2,400 ft. tile sewer; steel water tower; gasoline engines & power pump; Willis Chipman, C.E., Toronto	L. A. Duncan, Sec'y-Treas.
New Jersey	East Orange	May 24	Furnishing wrought iron pipe, all makes; old bids rejected	William Cardwell, Mayor.
Pennsylvania	Chester	May 24	Laying flanged intake pipe in Del. river; bldg. brick well; laying 36-in. suction pipe; bldg. addition to pumping station, install. two 300-h.-p. water-tube boilers, one 10,000,000 to 12,000,000-gal. cross-com. high-duty pump, 40 tons lead, 1 1-2 tons caulking lead, furn. and laying and connecting new force mains	A. W. McCallum, Gen. Mgr., Wtr. Co.
Kansas	Halstead	May 25	Constructing water works system	Burns & McDonnell, Engrs.,K.C.,Mo.
Illinois	Chicago	May 27, 11 a.m.	Furn. and erect. 2 vert. trip.-expans., cond., self-contained, crank and fly-wheel pumping engines, each of 2,500,000 gals. capacity, 24 hours, inc. 25-ton electric crane	John J. Hanberg, Comr. Pub. Wks.
Kentucky	Madisonville	June 1, noon	Purchase of water works franchise	Jas. L. Brown, City Clerk.
Philippine Is.	Manila	June 1, noon	Furnishing 7,000 tons c. i. pipe, hub and spigot; 56 tons 20-in. flexible joint and flange c. i. pipe; 2 tons flanged c. i. pipe; 200 tons c. i. specials; J. F. Chase, Ch. Engr. Dept. Sewers & Wtr.	H. L. Fischer, Sec'y Municipal Bd.
Virginia	Lawrenceville	June 1	Sale of 25-year water and sewerage franchise; 2,400 people	City Clerk.
California	San Francisco	June 12	Furn. 1,200 hydrants for auxiliary water system	Marsden Manson, City Engineer.
SEWERAGE				
Ohio	Toledo	May 6, noon	Bldg. drain relief sewer 1,079, Sewer Dist. 15; $10,800	Reynold Voit, Sec'y Bd. Pub. Serv.
Ohio	Mt. Gilead	May 6, noon	Constructing sewerage system and disposal plant, $8,500	W. B. Eells, c. o. Vil. Clerk.
Ohio	Hamilton	May 6, noon	Constructing storm water and sanitary sewer, 2 streets	Chas. Pabst, Sec'y Bd. Pub. Serv.
Minnesota	St. Paul	May 6, 2 p.m.	Constructing sewer on Laurel ave.	P. H. Van Hovan, Pres. Bd.Pub.W's.
Oklahoma	Guthrie	May 6, 5 p.m.	Constructing district sewer No. 49 and sanitary sewers 11 and 12	E. W. Kinnan, City Clerk.
Indiana	Fort Wayne	May 6, 7:30 p.m.	Constructing vit. pipe sewers in 2 alleys	Edw. J. Lennon, Chm. Bd. Pub.Wks.
Kentucky	Louisville	May 7, noon	Bldg. Sec. E, Beargrass intercepting sewer, Contract No. 35	W. C. Nones, Chm. Comrs. Sewerage.
Maine	Portland	May 7	Constructing sewers at Forts McKinley and Williams	Capt. F. J. Morrow, Q.M.
Wisconsin	Beloit	May 7, 10 a.m.	Constructing 10,000 ft. 12- to 24-in. vit. pipe storm sewer	Robert Caldwell, City Engineer.
Pennsylvania	Lansdowne	May 7, 8 p.m.	Bldg. 1,000-ft. branch sewer, 2 aves. A. Culver Boyd, Chm. Com.	John W. Davis, Borough Sec'y.
Virginia	Portsmouth	May 10	Furn. and erecting 2 pair ejectors, 1 pair 1,000, other 400 gals.; also bldg. 2 c. i. chambers for ejectors with connections, etc	Bascom Sykes, City Engineer.
Ohio	Lima	May 10, noon	Constructing sewers	L. L. Crumrine, Sec'y Bd. Pub. Serv.
Ohio	Norwood	May 10, noon	Constructing storm water sewer in Lawn ave	Board of Pub. Serv.
North Dakota	Bathgate	May 10, 1 p.m.	Bldg. sewer, septic tank, tank and pump. house; $500 check	Saml. F. Crabbe, Fargo, Engr.
Oklahoma	Bartletsville	May 10, 5 p.m.	Constructing sanitary sewers; cost, $7,500	H. A. Beasley, Mayor.
South Dakota	Plankinton	May 10, 8 p.m.	Constructing complete sewer system	T. W. Traubman, Mayor.
Kansas	Lindsborg	May 10	Constructing 7 miles 8, 10, 12 and 15-in. sanitary sewers	H. A. Howland, McPherson, Engr.
Wisconsin	Watertown	May 11, 2 p.m.	Bldg. sanitary and storm sewers	F. S. Weber, City Clerk.
Ohio	Ashtabula	May 11	Bldg. 4,295 ft. 10 to 20-in. pipe sewer, etc., in 5 streets	A. J. Richardson, Clk. Bd. Pub. Serv.
Maryland	Baltimore	May 12, 11 a.m.	Bldg. storm water drains; Contract No. 7; 20,000 ft. approximate, 12 to 54-in. concrete sewer	J. Barry Mahool, Pres. Bd. Awards.
Alabama	Mobile	May 12, noon	Furn. material and constructing 33,000 ft. 10 to 30-in. pipe sewers; 30,000 ft. 6-in house connections, manholes, etc	J. T. Schley, Pres. Bd. Pub. Wks.
Pennsylvania	Danville	May 13	Bldg. 66-in. storm water sewer, 1,000 ft. long	Bd. Trus., State Hospital.
Ohio	Dayton	May 13, noon	Furnishing clay and iron sewer pipe	W. H. Bussard, Clk. Bd. Educat'n.
South Dakota	Huron	May 14, 8 p.m.	Bldg. 2 main sewers; Loweth & Wolff, St. Paul, Minn., Engrs.	M. Schoenert, City Clerk.
Wisconsin	Oshkosh	May 15, 2 p.m.	Bldg. sewers in sundry streets	W. A. Marden, Chm. Bd. Pub. Wks.
Indiana	Ft. Wayne	May 17, 10 a.m.	Dredging Willow creek and tiling branches in Allen and Noble counties; cost, $70,000	David Spindler, Surveyor, Allen Co.
Wyoming	Basin	May 17, 7:30 p.m.	Constructing sewerage system	M. O. Barnes, Mayor.
Ohio	Van Wert	May 18, 10 a.m.	Constructing concrete sewers	Surveyor Van Wert County.
New York	Syracuse	May 18, noon	Constructing 2 1-3 miles main intercepting sewer from 9 to 33 inches in diameter; principal items are 90,000 cu.yds. excavation and 6,000 cu. yds. concrete; check, $10,000	Harry J. Hamlin, Sec'y Sewer Bd.
Saskatchewan	Estevan	May 19	Bldg. 2,400-ft. tile sewer, water works, etc	L. A. Duncan, Sec'y-Treasurer.
North Carolina	Wilmington	May 20	Furnishing terra-cotta pipes	W. E. Springer, Mayor.
Kentucky	Louisville	May 21, noon	Bldg. Sec. A, N.E. trunk sewer and Sec. A, Beargrass Imp	J. B. F. Breed, Ch. Engr. Sew. Com.
Ohio	Oberlin	May 22, noon	Constructing sewage disposal plant	Village Clerk.
New Mexico	Carlsbad	May 24, noon	Constructing sanitary sewer system	J. B. Harvey, City Clerk.
Iowa	Des Moines	May 24, noon	Constructing tile drain, District No. 7	H. B. Frase, County Auditor.
Minnesota	Albert Lea	May 26, 5 p.m.	Labor and material for Spring Lake Park trunk sewer	Wm. Barneck, City Engineer.
Virginia	Lawrenceville	June 1	Sale of sewerage and water works franchise; pop. 2,400	City Clerk.
BRIDGES				
South Carolina	Gaffney	May 6	Bldg. steel bridge over Broad river at Smith's ford	C. F. Gordon, Superv. Cherokee Co.
Ohio	Logan	May 7	Constructing concrete arch culvert	Bd. Com'rs, Hocking Co.
Ohio	Cincinnati	May 7, noon	Concrete bridge on Old State road in Miami twp	Fred. Dreihs, County Clerk.
Ohio	Steubenville	May 7, 1 p.m.	Constructing bridge No. 21 in Warren township	J. M. Reynolds, County Auditor.

BIDS ASKED FOR

STATE	CITY	RECEIVED UNTIL	NATURE OF WORK	ADDRESS INQUIRIES TO
			BRIDGES—Continued	
Pennsylvania...	Wilkes-Barre....	May 7, 2 p.m.....	Bldg. 16 stone arch bridges, total cost, $7,800; 3 concrete bridges $850, $1,200 and $500; iron bridge, $1,800; cement or stone and bridge 14, $800 and $650; iron bridge, $2,500; steel or concrete bridge, $2,000; concrete flat deck bridge, $800; and bridge No. 26, $450; 27 structures in all.....	Jas. M. Norris, County Controller.
Washington....	Marietta.....	May 7, 1:30 p.m...	Bldg. $1,200 to $1,400 bridge over Nooksack river.....	Alex. Van Wyck, County Auditor.
Maryland.....	Hagerstown.....	May 7.....	Bldg. rein. concrete girder extension of bridge over creek.....	John F. Wagaman, County Clerk.
Ohio.....	Hamilton.....	May 8, 10 a.m.....	Bldg. 2 steel or rein. concrete bridges, Oxford & Reily twps.....	Jos. E. Brate, County Auditor.
Indiana.....	Wabash.....	May 10.....	Constructing $1,600 bridge.....	County Surveyor.
Pennsylvania...	Doylestown.....	May 10.....	Constructing 4 concrete bridges for county.....	Cornelius T. Haldeman, Co. Comr.
Ohio.....	Zanesville.....	May 10, noon.....	Bldg. 2 storm abutments for bridge over Big Salt Creek.....	L. E. Brelsford, County Auditor.
Indiana.....	Richmond.....	May 10, 11 a.m.....	Constructing 11 bridges for Wayne County; cost, $25,000.....	Board of County Commissioners.
Pennsylvania...	Reading.....	May 10, 10 a.m.....	Scraping, cleaning and painting Cross Keys bdge.over Schuylkill	County Controller.
Ohio.....	New Haven.....	May 10.....	Bldg. steel or iron superstructure, 665 ft. long, 14-ft. rdway.....	F. O. Ronk, Co. Auditor, Norwalk.
South Dakota..	Sisseton.....	May 11, noon.....	Constructing 2 steel bridges over Whetstone river.....	J. A. Ray, County Auditor.
Ohio.....	Cleveland.....	May 12, 11 a.m.....	Bridge work per Report No. 2292, conc. arch, McCracken's Road	Wm. F. Black, Clk. Co. Comrs.
Pennsylvania...	New Castle.....	May 12, noon.....	Bldg. steel or iron concrete bridge over Neshannock Creek.....	J. A. McMillan, Chm. Co. Comrs.
Missouri.....	Kansas City.....	May 12.....	Bldg. 3 bridges and 4 rein. concrete culverts.....	S. A. Boyer, Clk. Com'rs.
New Hampshire	Laconia.....	May 13.....	Bldg. 2-span rein. concrete arch bridge; each span 65 ft.....	Chas. A. French, City Engineer.
Ohio.....	Dayton.....	May 13, 11 a.m.....	Bldg. self-closing bridge over M. & E. canal 50 ft. long and provide 40-ft. waterway and 10-ft. towing path, and have 20-ft. roadway and two 6-ft. walks, plank, steel, concrete or creodone block floor; model to accompany all bids.....	Chas. W. Haines, Pres. Bd. Co. Com
Ohio.....	Cincinnati.....	May 14, noon.....	Rebuilding abutment on Lockwood road.....	Stanley Struble, Pres. Co. Comrs.
New Jersey....	Morristown.....	May 17.....	Bldg. $2,500 bridge over Whippany to carry main sewer pipe; bridge to have 2 conc. piers in river faced with iron.....	Board of Sewer Comrs.
Georgia.....	Cedartown.....	May 17.....	Bldg. iron bridge over Cedar creek for Polk county	J. L. Moore, Chm. Bd. Rds. & Riv.
Ohio.....	Mansfield.....	May 17, noon.....	Furn. and erecting 84 ft. high truss bridge, 14-ft roadway; abut..	Geo. H. Weidner, County Auditor.
Ohio.....	Lima.....	May 18, noon.....	Constructing 177 ft. steel bridge Marion twp.; cost, $7,700; also 90 ft. concrete bridge and two 45-ft. arches.....	C. E. Craig, Eng., Allen Co.
Ohio.....	Massillon.....	May 20, 10 a.m.....	Bldg. concrete bridge of two 60-ft. spans.....	M. W. Oberlin, County Auditor.
South Dakota..	Mitchell.....	May 20.....	Constructing various bridges.....	H. B. Anderson, County Clerk.
Quebec.....	Gaspe.....	May 21.....	Bldg. steel superstructures of 14 bridges and trestles, total length	
Indiana.....	Greenfield.....	May 22, 10 a.m.....	Constructing Benford Bridge.....	C. H. Troy, County Auditor.
Michigan.....	St. Joseph.....	May 24, 2 p.m.....	Bldg. $1,000 bridge over Yellow creek.....	Herman Radke, Royaltown.
Texas.....	Galveston.....	June 28, noon.....	Building a causeway across Bay between Galv. Island and Virginia point.....	John M. Murch, Co. Aud.
Ohio.....	Toledo.....	July 1, noon.....	Labor and material for rein. concrete arch bridge (except lift draw); also foundations, piers, apparatus, etc., for bridge over Maumee river at Main st.; $525,000 available; check, $50,000.	Reynold Voit, Sec'y Bd. Pub. Serv.
			LIGHTING AND ELECTRICITY	
Illinois.....	Chicago.....	May 8, 11 a.m.....	Furnishing gasolene lights on certain sts., 1 year from Sept. 1st..	Wm. Carroll, City Electrician.
New York.....	Syracuse.....	May 10.....	Bldg. new manual fire alarm telegraph system; $50,000.....	Board of Contract and Supply.
North Dakota..	Bathgate.....	May 10, 1 p.m.....	Erecting power house, tunnel, etc., State Blind Asylum.....	Alex. Morrison, Sec'y Blind Asylum.
California.....	Upland.....	May 10.....	Gas franchise from city.....	City Clerk.
Tennessee.....	Ripley.....	May 10.....	Furn. engines, boilers, etc., and installing 15-ton ice plant.....	W. A. McCalhoun, Mgr. Light Co.
Ohio.....	Columbus.....	May 10.....	Bldg. addition to power house at Ohio State University.....	Carl E. Stub, Sec'y State Univ.
Minnesota.....	Warren.....	May 11.....	Furn. 125-h.-p. internal furnace boiler, 160 lbs. work. pres.....	W. R. Haney, Supt. Lt. & Wtr. Dept.
Kentucky.....	Louisville.....	May 12.....	Franchise to furnish private lights in block; price, $1,000.....	Board of Public Works.
Ohio.....	Lorain.....	May 13.....	Lighting sts., etc., old bids of Feb. 20 rejected.....	A. W. Thomas, Clk. Bd. Pub. Serv.
Oregon.....	Portland.....	May 14.....	Light sts., aves., bldgs. and public places with incandescent lights for 3 or 5 years; also bldgs., with gas, etc.....	A. L. Barbur, City Auditor.
Indiana.....	Rushville.....	May 14, 7:30 p.m...	Constructing extension to municipal electric light plant.....	S. G. Gregg, City Clerk.
Missouri.....	Sedalia.....	May 17.....	Lighting sts. and other public places for 10 yrs. from Nov. 1, with magnetite lamps.....	J. L. Babcock, Pres. City Council.
Ohio.....	Toledo.....	May 18, noon.....	Remodeling steam heating mains in tunnels of State Hospital...	Geo. R. Love, Supt. State Hospital.
Pennsylvania...	Wilkes-Barre....	May 20, noon.....	Lighting certain streets with arc electric lights.....	Fred H. Gates, City Clerk.
North Carolina.	Wilmington.....	May 20, noon.....	Lighting city with gas or electricity.....	W. E. Springer, Mayor.
Ohio.....	Toledo.....	May 22, noon.....	Furn. and install. 2 duplicate elec. generators, 100 kw. each; 2 vert. 3-cylinder gas engines, switchboard, etc.....	Reynold Voit, Sec'y Bd. Pub. Serv.
Pennsylvania...	Butler.....	May 25.....	Lighting town, etc.; no restriction on style of light.....	Chm. Schnitzer, Lighting Com.
Ohio.....	Bridgeport.....	June 1.....	Lighting village over 4,000 with gas or electricity.....	R. T. Michener, Village Clerk.
Indiana.....	Vincennes.....	June 8, 2 p.m.....	Lighting sts. at expiration of existing contract Apr. 29, 1910, for 10 yrs. with 260 enclosed arc lamps of 2,000 c.-p. equal to 466 watts each, or 7.5 amperes at 70 volts at lamp terminals; in addition 220 16-c.-p. incandescent lamps must be placed ready for use.....	C. L. V. Tucker, Clk. Bd. Pub. Wks.
Massachusetts..	Boston.....	July 1.....	Lighting streets with gas for 5 years.....	Guy C. Emerson, Supt. Sts.
			MISCELLANEOUS	
New Jersey....	Newark.....	May 6.....	Furn. and setting up 1-2 yd. steam dipper dredge at west end of Peddie st. ditch; also to purchase old city dredge.....	M. R. Sherrerd, Ch. Engr. Bd. Wks.
Pennsylvania...	Philadelphia.....	May 6, noon.....	Repairing Arch street pier.....	Director, Dept. Docks and Ferries.
Pennsylvania...	Philadelphia.....	May 6, noon.....	Furnishing uniforms for Park Guards.....	Comrs. of Fairmount Park.
Pennsylvania...	Phoenixville.....	May 7.....	Constructing retaining wall near water works.....	E. A. Barkley, Chm.
Dist. Columbia.	Washington.....	May 10, 2 p.m.....	Furn. comb. chemical engine and hose wagon.....	F. W. Wagner, Ch. Engr. Fire Dept.
Ohio.....	Cleveland.....	May 10.....	Constructing fire escapes on 5 school buildings.....	Charles Orr, School Director.
Massachusetts..	Boston.....	May 10.....	Furn. and erecting 7,000 lin. ft. iron fence.....	W. S. Youngman, Sec'y Charles River Basin Comm.
Illinois.....	Chicago.....	May 11, 11 a.m.....	Furnishing 16 boilers for fire engines.....	James Horan, Fire Marshal.
Louisiana.....	New Orleans....	May 11, 7:30 p.m...	Fabrication and erection of structural steel and cast-iron for additions to three steel sheds on wharves; deposit, $1,000.....	Hugh McCloskey, Pres. Port Comrs.
Ohio.....	Elmwood Place..	May 12, noon.....	Erecting Town Hall; P. E. Moosmiller, Arch., Norwood.....	John J. McQueen, Vil. Clerk.
Ohio.....	Columbus.....	May 12, noon.....	Improving M. & E. Canal, cost, $100,000; 7,000 bbls. cement....	Chas. E. Perkins, Ch. E., State B.P.W.
Georgia.....	Augusta.....	May 12.....	Flood protection works; $250 check, $5,000 bond; raising masonry of bulkheads at locks; raising and reinforcing earth bank along canal; bldg. masonry retaining wall, paving and surfacing, to include 160 cu. yds. rubble masonry; 60,000 cu. yds. earth; 30,000 cu. yds. brick masonry in wall; 14,000 sq. yds. paving; 2,000 cu. yds. earth surfacing.....	Nisbet Wingfield, Com'r Pub. Wks.
Indiana.....	Indianapolis.....	May 13.....	Completing Indianap. Newcastle & Toledo Elec. Ry. to Newcast.	Union Trust Co., Receiver for Ry.
West Virginia..	Wheeling.....	May 14, 11 a.m.....	Furnishing, etc., 13,000 bbls. Amer. Portland cement, Dam 19..	Capt. F. W. Alstaetter, Eng'r Corps.
Hawaii.....	Honolulu.....	May 14, noon.....	Furn. 25,000 bbls. Portland cement.....	E. E. Winslow, Eng. Corps. U. S. A.
Arkansas.....	Searcy.....	May 14.....	Enlarging and improving county jail.....	R. W. Crisp, County Judge.
Montana.....	Butte.....	May 15, noon.....	Erecting new county jail and temporary court house.....	Link & Haire, Architects.
Virginia.....	Richmond.....	May 17, 4 p.m.....	Purchase and removal of all coal and water gas tar, and crude ammoniacal gas liquor produced at city gas works for 2, 3, or 5 yrs. from July 1; tars per gal.; ammoniacal liquor on basis of 2,240-lb. ton, delivered at storage tanks in city.....	W. P. Knowles, Supt. Gas Works.
Ohio.....	Columbus.....	May 17, noon.....	Constructing $75,000 garbage plant.....	E. W. Hirsch, Sec'y Bd. Pub. Serv.
Ohio.....	Cleveland.....	May 18, noon.....	Constructing and operating st. railroads, 4 ordinances.....	Peter Witt, City Clerk.
Ohio.....	Cleveland.....	May 19, noon.....	Constructing and operating st. railroads, 4 ordinances.....	Peter Witt, City Clerk.
Ohio.....	Cleveland.....	May 20, noon.....	Constructing and operating st. railroads, 6 ordinances.....	Peter Witt, City Clerk.
Utah.....	Ft. Douglas.....	May 25.....	Bldg. garbage crematory and crematory bldg.....	Capt. T. R. Harker, Q.-M.
Ohio.....	Columbus.....	July 15, noon.....	Bldg. concrete retaining wall; Contract No. 18, inc. 800 cu. yds. excav., 765 cu. yds. loam, 1 acre seeding, 220 sq. yds. sodding, 800 cu. yds. concrete, 2,000 lbs. twisted steel rods.....	E. W. Hirsch, Sec'y Bd. Pub. Serv.
California.....	San Francisco...	June 10.....	Bldg. 2 sections sea wall, 1,300 ft. long; cost, $200,000; Sec. 8, 300 ft. long, 32,000 tons rock fill., 4,000 bbls. cement; Sec. 9; 1,000 ft. concrete sea wall, inc. 1,000 ft. concrete bulkhead, 85,000 tons rock fill., 181 tons structural steel; 13,000 bbls. cement; structures go 30 ft. below city base.....	Secretary Thorp, Harbor Board.
Illinois.....	Chicago.....	Sept. 15.....	Furn. voting machines up to $400,000 value.....	Election Commissioners.

STREET IMPROVEMENTS

Birmingham, Ala.—The Finance Committee has recommended the paving of Third avenue with vitrified brick, the sidewalking of Fourteenth street and the improvement of alley I.

Eufaula, Ala.—Council has appropriated $1,500 from the dispensary funds for street improvements.

Mobile, Ala.—The Board of Public Works instructed the Chief Engineer to prepare estimates for paving Spring Hill avenue, Broad street and Davis avenue.

Mobile, Ala.—The Board of Road and Revenue Commissioners will construct a road between this city and Citronelle; distance, 35 miles.

Northport, Ala.—Council is considering the laying of concrete sidewalks on the principal streets of the town.

Selma, Ala.—Citizens are again considering the building of a modern highway from this city to Mulberry; County Commissioners will begin work June 1 on highway from this city to the Autauga line and the Autauga County Commissioners will begin work toward this city at the same time.

Phoenix, Ariz.—The Central Avenue Improvement Association has decided to expend about $35,000 for improvement of highway.—Capt. Samson, Secretary.

Auburn, Cal.—The Auburn, Roseville and Lincoln Chambers have combined to bring before the Placer County Board of Supervisors through committees to be appointed by each Chamber, the question of raising a fund to be expended in putting the principal county roads in good condition.

Chico, Cal.—City Engineer Polk has reported to the Board of Trustees that he expects to be able to submit a complete and perfect plan for the proposed improvements of the streets very soon.

Marysville, Cal.—Council is considering an ordinance for a system of cement sidewalks throughout the business portion and into the residence district of the city.

Oakland, Cal.—Council has adopted resolutions for grading and guttering five thoroughfares and paving Leedmont avenue.

Pasadena, Cal.—City Engineer Van Ornum has estimated cost of improving Boylston street at $1.40 per front foot; Council is considering the sidewalking of Marengo avenue and the oiling and grading of Crescent drive.

Sacramento, Cal.—County Surveyor C. M. Phinney has submitted a report to the Board of Supervisors showing that the estimated cost of the work of improving the lower stretch of the Lower Stockton road is $48,000; stretch to be improved extends south of Franklin for a distance of about 8¾ miles.

Stockton, Cal.—San Joaquin County has voted to issue $1,890,000 bonds for the building of 238 miles of permanent stone highway.

Bridgeport, Conn.—The Director of Public Works will expend $2,000 in grading streets; also will pave with macadam the following streets: Central, cost $400; Admiral, $1,000; Ogden, $1,000; Fourth, $600, and Gem, $400.

Waterbury, Conn.—The Board of Public Works has decided to advertise for the paving of Grand and East Main streets; also ordered the grading of Pine street; City Engineer Cairns has estimated the grading of North Main street at $7,000.

Dover, Del.—Council has named Walter Morris, William Denney, William H. Walker, Cecil C. Fulton and Thomas Muncey as a street and road commission; $166,000 will be spent on new streets.

Bradentown, Fla.—County Commissioners are considering the issuing of $250,000 bonds for constructing hard roads.

St. Augustine, Fla.—Mayor Masters has recommended the laying of cement walks through the plaza to take the place of the present gravel walks.

Atlanta, Ga.—City will pave Decatur and Marietta streets with wood blocks; cost, $20,000.

Batavia, Ill.—Council has passed ordinances providing for sidewalks on Blew and Jefferson streets.

Chicago, Ill.—The West Randolph Street Business Men's Association has been organized to secure the repaving of that street.—Hugo F. Bauer, Secretary.

Chicago, Ill.—The Board of Local Improvements is considering the paving of Monroe street with creosote blocks.

East St. Louis, Ill.—Council is considering ordinances for the paving, on concrete of First and Market streets; also two miles of street paving on Illinois avenue; City Engineer W. J. Crocken is preparing plans. Council has also passed ordinances for the improvement of Eleventh street, cost $6,900, and Fourteenth street, cost, $8,150.

Herscher, Ill.—Town is considering the paving of Main street for its full length.

Moline, Ill.—City is considering construction of asphalt pavements on Fifth, Seventeenth, Eighteenth, Nineteenth and Twentieth avenues.—C. J. Anderson, City Engineer.

Rock Island, Ill.—Plans are being prepared by City Engineer W. Treichler for brick paving in various streets.

Springfield, Ill.—Council has passed ordinance for the paving of Carpenter street to Seventeenth street; estimated cost, $31,000.

Evansville, Ind.—City Engineer Saunders has submitted specifications to the Board of Works for the improvement of Fourth street; the improvement of West Michigan street has been ordered.

Tipton, Ind.—Bids will be advertised for the construction of a gravel road in Wildcat Township.—J. F. Barlow, County Auditor.

Anamosa, Ia.—Council has voted to pave Huber street with vitrified paving blocks.

Davenport, Ia.—Council has passed ordinances for the paving of Seventeenth, Eighteenth and Nineteenth streets and First avenue with brick and Fourteenth and a Half street with asphalt.

Moquoketa, Ia.—Council has adopted resolutions for the paving of Main, Platt, Pleasant and Olive streets.

Mt. Pleasant, Ia.—Committee has been investigating various kinds of pavement with a view to paving the main streets in this city this summer.—Councilman Van Allen, Chairman.

Concordia, Kan.—Citizens are urging the paving of three blocks on Sixth street.

Hiawatha, Kan.—City is considering the paving of several streets.

Leavenworth, Kan.—The Board of Commissioners is considering the paving of Osage and Ottawa streets; also ordered bids advertised for the paving of Chestnut street with oil and macadam; also for the paving of Third and Elm streets.

Leavenworth, Kan.—The new City Commissioners are already laying their plans for improving the city and unless their plans miscarry, Leavenworth, in the next year, will have six miles additional paved streets at a cost of only $175,000; plans have practically been settled upon and the streets to be paved have been selected as follows: Kiowa, Elm, Shawnee and Scott streets; bids have already been asked on five others.

Salina, Kan.—Council has passed ordinances providing for the paving of Iron avenue and Eighth street.

Fulton, Ky.—City is considering issuance of $40,000 bonds for macadamizing and paving streets.

Lexington, Ky.—The Board of Public Works will take preliminary steps to advertise for bids for the construction of concrete sidewalks, curbing and guttering on a number of the city streets, in compliance with the ordinance to that effect enacted a short time ago; streets to be included in the order are Main, Church and West Fourth.

Baltimore, Md.—Commissioners for Opening Streets have ordered preliminary survey made of Edmondson avenue, between Second street and the new bridge across Gwynns Falls, with a view of eventually paving the thoroughfare with a modern paving material; distance to be improved is about a mile, and the cost of the work will amount to $90,000.

Baltimore, Md.—City Engineer Fendall has decided to pave half of the St. Paul Street Boulevard Bridge with Imperial pavement early in the summer as a test of the system.

Baltimore, Md.—The West Baltimore Improvement Association is urging the paving of Carey street; cost, $50,000.

North East, Md.—Town Commissioners are compelling property owners to relay defective sidewalks.

Boston, Mass.—The Board of Aldermen has passed bill providing a $300,000 loan for the laying out department of the Street Commissioner's office.

Chester, Mass.—State Highway Commission has appropriated $11,464 toward the construction of a State road.

Chicopee, Mass.—The Board of Aldermen has decided to issue $24,000 bonds for the paving of parts of West Sheridan, Springfield, Belcher and Prospect streets and Broadway.

Gloucester, Mass.—Council is considering an order appropriating $1,500 for a pneumatic drill.

Lawrence, Mass.—City Engineer Marble will advertise for bids for the edgestone and flagging to be used by the city during the year.

Lowell, Mass.—County Commissioners will construct a first-class road from the Yellow Meeting House, Dracut, to the Pelham, N. H., line, a distance of nearly two miles; cost, $12,000.—County Engineer Kendall.

Bay City, Mich.—Residents of Fifth avenue, between Johnson and Trumbull streets, the section recently ordered paved with asphalt, are preparing to make the thoroughfare a boulevard; plans are nearing completion; promoters will increase the pavement at their own expense and make it so well lighted that it will prove popular at night for autoists and drivers of all vehicles.

Benton Harbor, Mich. — Council has passed a resolution to improve Maple street by paving with brick on a sand foundation and curbing with combined curb and gutter; estimated cost, $3,097.15.—A. H. Burger, City Clerk.

Detroit, Mich.—Alderman Andrew J. Walsh will introduce a resolution at Council meeting to forbid the laying of cedar pavements in the city; he estimates that he will save the city above $100,000 a year by the measure, and states that the resolution will embody a clause to have the city pay a part of the original paving assessment for a brick or asphalt pavement, so that the entire burden will not fall on the owners of abutting property when the new pavement is put down.

Lansing, Mich.—City Engineer H. A. Collar has estimated cost of paving Kalamazoo street three blocks with brick on a concrete foundation and concrete curb, at $11,736.

Lansing, Mich.—Council has ordered plans and estimates prepared for macadamizing three blocks of Walnut street South.—H. A. Collar, City Engineer.

Greenbush, Minn.—Council has ordered plank sidewalks laid on various streets.

Fulton, Mo.—Plans have been completed by P. D. Thurmond, City Engineer, for 8,000 square yards of macadam; plans will be prepared for 7,000 square yards additional.

Springfield, Mo.—Estimates for regraveling about 7,000 feet of the road and constructing one new culvert and repairing others are being made by C. E. Phillips, National Boulevard Engineer; work will cost about $6,000.

St. Louis, Mo.—City will pave Market street with asphalt from Broadway to the Union Station.

Atlantic City, N. J.—Governor Fort has signed bill allowing city to issue $100,000 street improvement bonds.

Belleville, N. J.—Township Committee is considering the paving and curbing of the sidewalks on New Bridge street.—E. E. Mathes, Clerk.

Bridgeton, N. J.—The Bridgeton & Millville Traction Company has announced that it will at once proceed to rebuild the pike between Bridgeton and Millville, and put the road in first-class shape; highway has been almost impassable for years.

Camden, N. J.—Camden County Board of Freeholders has decided to improve Haddonfield turnpike.

Cape May, N. J.—Council has passed ordinances requiring sidewalks of concrete in all parts of the city.

Jersey City, N. J.—The Monticello Avenue Improvement Association has asked the Street and Water Board for better sidewalks and more lights.—Immanuel Britten is interested.

Jersey City, N. J.—The Street and Water Board has adopted specifications for the widening and repaving of Jackson avenue between Communipaw and Kearny avenues; plans provide for the taking off of 18 inches of each sidewalk and thus widening the roadway three feet.

Newark, N. J.—The Board of Street and Water Commissioners is considering the opening of eleven streets.—Wm. C. Greathead, Clerk.

Orange, N. J.—Under the direction of the Street Committee of Council a man will be set to work to canvass the city in order to get a complete list of the sidewalks that need repairing; this will be presented to the Council and action to compel property owners to have them put in proper condition will follow.

Orange, N. J.—Bids for paving Arlington avenue, East Orange, at its northern end, which were received by City Council April 12, have been all rejected in order that the new method of building macadam roads, recently explained to the Road Committee of that body by Engineer Frederic A. Reimer, might be tried.

Paterson, N. J.—The County Board of Freeholders has instructed County Engineer to make a survey of Union avenue.

Salem, N. J.—Council will ask the Board of Freeholders to make Yorke street, Salem, a State road, to connect the Lower Alloway's Creek State road with the one that will soon be built from Salem to Quinton.

Trenton, N. J.—City is considering the paving of Pearl street with sheet asphaltum.—H. B. Salter, City Clerk.

Albany, N. Y.—Governor Hughes has signed Assemblyman Evans' bill permitting the Board of Supervisors of Orange County to increase from $500,000 to $1,000,000 the amount of bonds that may be issued for highway improvement.

Albany, N. Y.—Assembly has passed the Merritt bill appropriating $1,397,000 as the State's share of the cost of repairing highways.

Buffalo, N. Y.—The Board of Councilmen has decided on the grading and macadamizing of Hamburg turnpike.

Cooperstown, N. Y.—The Board of Trustees has decided to pave 50,000 square feet cement walks.

Rensselaer, N. Y.—Council has directed City Clerk Salt to advertise for bids for the paving of the following streets with granite block: Harrison, Glen, John, Washington, Central, Forbes and Second.

Schenectady, N. Y.—The Board of Supervisors has passed a resolution approving of the South Schenectady-Mariaville road, as approved by the State Highway Commission; the route will be practically along the old road, through the Weise property.

Troy, N. Y.—Commissioners of Public Works have been given authority to expend $100 in purchase of asphalt oil to be used in covering macadam pavement on Fifth avenue.

Marshall, N. C.—Citizens have voted $20,000 bonds for street improvements.

Wadesboro, N. C.—Citizens will vote in May on $10,000 bonds for street improvements.

Towner, N. D.—Citizens have petitioned County Board for a highway along the Mouse River.

Akron, O.—Council has passed ordinances providing for the improvement of Ladd, Sumner, Market, Arch, Marcy streets, Kenmore boulevard, Schell and Stanton avenues.

Akron, O.—Council is considering the improvement of Buchtel and Wooster avenues.

Ashtabula, O.—Council has ordered plans and specifications prepared for grading and sidewalks on Berryville avenue and Fern street.

Bucyrus, O.—Council has decided to improve Galeon and Walnut streets.

Cincinnati, O.—The Board of Public Service has estimated cost of improving Glenway avenue at $46,785; Council is considering the improvement of James alley, Wilson avenue, Margaret, Clifton and Van Hart streets.

Cincinnati, O.—H. F. Shipley, of the Streets and Sewer Department, has estimated the cost of paving three miles of Madison road with tarvia at $48,000.

Cincinnati, O.—The Board of Public Service has requested City Solicitor Ballard to prepare an ordinance authorizing the expenditure of $1,000 in the establishment of a municipal laboratory for the testing of paving materials.

Cincinnati, O.—County Surveyor Cowen, April 30, reported to the County Commissioners that the proposed extension of Hillside avenue, from the North Bend road to the Cleves and Warsaw pike, would cost the County $34,394; Commissioners have ordered plans and specifications.

Columbus, O.—Council will be asked to authorize the issue of $43,000 bonds to pay city's share in paving three streets, including Central avenue.

Dayton, O.—Upon the recommendation of the Committee of the Whole, Council will pass the resolution declaring for the improvement of South Wayne avenue, which contemplates the cutting down of the hill and the paving of the thoroughfare; cost, about $13,000.

Dayton, O.—Bids will be received May 8, 11 a. m., for $20,000 road improvement bonds.—F. E. Tumson, Clerk Montgomery County Commissioners.

McArthur, O.—Citizens have defeated proposition to issue $28,000 bonds for street paving.—C. J. Smith, Corporation Clerk.

Massillon, O.—Council is considering the guttering and grading of Fremont street and the paving of Diamond alley; City Engineer Howard has estimated the cost of paving Plum street at $1,702 and Cedar street at $913.20.

Norwalk, O.—Council has passed two resolutions providing for the construction at once of a large number of new sidewalks and the repair of a great many more in all parts of the city.

Rocky River, O.—Bids will be received June 4, noon, for $3,000 bonds for improving the Wooster road.—K. W. Bassett, Village Clerk.

St. Clairsville, O.—Council has decided to improve Marietta street.—O. B. Nary, Clerk.

Steubenville, O.—Council has decided to improve West Euclid, Lake Erie and Lawson avenues.—W. M. Trainor, Clerk.

Toledo, O.—The Committee on Ways and Means will issue $50,000 bonds to pay for city's share of street improvements.

Toledo, O.—Council has decided to pave and grade Summit avenue from Michigan avenue to Bay View Park.—J. M. Babcock, Clerk.

Youngstown, O.—Council has decided to repave East Federal street and improve Commerce sctreet.—M. F. Hyland, Clerk.

Youngstown, O.—Council is considering an ordinance for a $130,000 bond issue for opening Chestnut street.

Alva, Okla.—City is considering paving a considerable number of streets; material undecided.—Kent Eubank, Chairman Committee.

Claremore, Okla.—Rogers County citizens will vote on $100,000 bonds for road and bridge construction.

Lawton, Okla.—Bids are being received on paving Avenue E.

Waurika, Okla.—Council will construct about five miles of brick pavement.

Weatherford, Okla.—City will expend $20,000 on street grading, etc.; $20,000 bonds are available.—Wm. Mackintosh, Oklahoma City, Engineer in Charge.

Dallas, Ore.—Bids have been asked for paving in the second district.

Portland, Ore.—City Executive Board has rescinded its action awarding contract to the Montague-O'Reilley Company for paving a large district in North Portland with Belgian block; action was recommended by City Attorney Kavanaugh on ground that contract had been awarded to firm before it was incorporated and that such action was illegal.

Allentown, Pa.—Lehigh County Commissioners will soon let contract for repair of about 3½ miles of macadam roadway between Allentown and Bethlehem.—R. S. Rathburn, County Engineer.

Altoona, Pa.—Mayor S. M. Hoyer has recommended a special tax to repair paved streets.

Ashley, Pa.—Council is considering the macadamizing of Hazleton street.

Blairsville, Pa.—Borough will vote May 11 on $20,000 bonds to provide money to pay its share of the cost of curbing and paving streets.

Brockwayville, Pa.—Borough has asked for State aid in paving Main street.

Butler, Pa.—Council has ordered bids advertised for the paving of Sullivan avenue, West, Thomas, Chestnut, Mercer and North Washington streets and Avery avenue.

Brockwayville, Pa.—Council is considering the improvement of Smithfield and a portion of Bond streets by paving or macadamizing.—John Tobin, President.

Donora, Pa.—A delegation of Donora business men will insist on some action by the County Commissioners looking toward the improvement of a County road to Monongahela.

Elizabeth, Pa.—County Commissioners J. D. O'Neil has announced that the river road from Yeassport to the improved Lovedale road will be improved.

Franklin, Pa.—The Street Committee has recommended that an ordinance be drafted for the grading, paving and curbing of Central avenue and Petroleum street.

Harrisburg, Pa.—A committee consisting of City Engineer Cowden, Water Superintendent Kennedy and Charles L. Schmidt, has decided upon the change of line of the road at Island Park; road is made necessary because of the heavy traffic of the Water Department to and from the filter station; new road will be almost straight from the bridge approach to the filtration station.

Harrisburg, Pa.—Council has authorized paving and curbing of Fifteenth and Sixteenth streets.—C. A. Miller, Clerk.

Hazleton, Pa.—Council has adopted specifications for paving Laurel street with either asphalt, wood, brick or other approved material.—City Engineer Youngman.

Johnstown, Pa.—Mayor Alex. Wilson has recommended extensive improvements to highways and Council is considering the paving of Ash, Cooper, New, Ruter, Coal, Church, Shayer, Sherman and Napoleon streets.

Lebanon, Pa.—Council has favorably acted on ordinance appropriating $300 for macadamizing South Sixth street.

McKeesport, Pa.—Plans for the proposed extension of Sylvan avenue, Eighth Ward, to Fifth avenue, are being prepared by the City Engineer.

Media, Pa.—The Board of Commissioners of Bidley Township, Delaware County, will create a $50,000 loan for improving the highways in Leiperville, Folsom and Holmes.

Monongahela, Pa.—Council is considering a $70,000 bond issue for the permanent improvement of streets.

Mt. Carmel, Pa.—Bids will be received about May 20 for street paving; cost, $40,000.—W. W. Robertson, Mt. Carmel, Engineer; John Carl, Jr., Town Clerk.

New Brighton, Pa.—Council has ordered a portion of Twelfth street curbed, graded and paved with vitrified brick.—G. F. Kennedy, President.

Phoenixville, Pa.—Bids for the materials needed to pave Bridge street will be asked for at once.—Jonathan Davis, Chairman Street Committee.

Pittsburg, Pa.—Director J. G. Armstrong has revived the matter of improving the river road in the West End, and this summer is likely to see the thoroughfare to McKees Rocks raised above ordinary flood level and surfaced with some lasting material.

Pittsburg, Pa.—The Committee on Public Works has favorably recommended schedules for street repairing which call for a $175,000 appropriation for repaving and $41,000 for board walks and steps.

Pittsburg, Pa.—Council has passed ordinance authorizing a $15,000 bond issue for regrading Ninth street and a $36,500 one for elevating Sandusky street above flood level.

Reading, Pa.—Mayor Rick has signed ordinances for the laying of pavements on Twelfth, Fifteenth, Cotton and Eleventh streets.

Rochester, Pa.—Borough will consider a $100,000 bond issue for paving various streets and erecting a public building.

Scranton, Pa.—The Public Works Committee has favorably recommended ordinance for the grading with vitrified brick and block stone of Luzerne street from Railroad avenue to Keyser Creek.

Scranton, Pa.—City is considering the awarding of a contract for the repair of the asphalt streets; Mayor John Von Bergen, Jr., is in favor of three to five-year term, while some members of Council favor a six-month term.

Scranton, Pa.—The Joint Appropriation Committee has granted an additional $3,000 for repairs to pavements other than asphalt; an extra $5,000 for repairs to unpaved streets and an extra $2,500 for new crosswalks.

Vandergrift, Pa.—Council has decided to pave Longfellow street, and has been petitioned to pave Emerson street.

Washington, Pa.—The County Commissioners have given notice that they have taken over from Robinson, Smith and Hanover townships the 12 miles of the historic Pittsburg-Steubenville pike in Washington County; Allegheny County authorities have arranged for the improvement of the road to the Washington County line; this County immediately will commence improving its share of the thoroughfare, while the road in Ohio is already reconstructed; within a few months a macadamized highway will be ready for use between Pittsburg and Steubenville.

Washington, Pa.—A petition signed by several hundred citizens in southern Washington County has been filed in court praying that the old plank road extending from Washington to the Greene County line be paved with brick.

Williamsport, Pa.—The Highway Committee will advertise for bids for repaving asphalt streets with brick, asphalt or wooden block.

York, Pa.—Property owners on East Market street near Broad street have petitioned for the paving of that thoroughfare.

East Providence, R. I.—Bids will be received May 5 for curbing, paving gutters and grading sidewalks on Summit street; also about 5,000 feet straight curb, delivered upon Summit street.—W. E. Smith, Town Clerk.

East Providence, R. I.—The General Assembly is considering an act which will give the Board the authority to order the construction of sidewalks wherever it may see fit.

Newport, R. I.—Commander Fullam of the Naval Training Station has asked the Navy Department for $21,000 for building roads, pavements, grounds and walks and $7,000 for paving and grading peninsula.

Chester, S. C.—Citizens will vote May 4 on $26,000 street and water improvement bonds.

Athens, Tenn.—Legislature is considering bill authorizing election on $250,000 bond issue for road construction.

Decaturville, Tenn. — Decatur County Turnpike Company has been incorporated to construct road from Decaturville to Parsons; distance, five miles; capital, $7,500.—Joseph Jennings, Promoter.

Knoxville, Tenn.—Council has ratified bill asking for an enabling act for the city to issue $50,000 bonds for widening the streets.

Knoxville, Tenn.—Council has passed several paving ordinances creating new improvement districts.

Loudon, Tenn.—Loudon County will vote on $100,000 for the construction and improvement of roads.

Martin, Tenn.—T. J. Taylor desires information on road surfacing with oil and other substances besides stone and gravel.

Martin, Tenn.—Citizens have voted to issue $30,000 in bonds for graveling streets.—C. W. Douglass, City Recorder.

Nashville, Tenn.—House has passed bill authorizing Blount County to issue road bonds.

Park City, Tenn.—The Street Committee has been directed by Council to advertise for bids for the grading of six streets; also for the resetting of the curbing on Virginia avenue.

Sparta, Tenn.—White County Commissioners are considering the building of pikes.

Benton, Tex.—Polk County has authorized the issue of $25,000 road and bridge bonds.

Canadian, Tex.—Hemphill County will grade roads and construct light bridge work.—H. H. Stickley, city, will have charge.

Norfolk, Va.—The Finance Committee has approved resolution of the Public Improvement Committee appropriating $1,100 for paving sidewalks on Front street.

Norfolk, Va.—The Public Improvement Committee has recommended a $1,500 appropriation for repairing Jamestown boulevard and one for $420 for a concrete pavement in Corprew avenue.

Roanoke, Va.—Roanoke and Botetourt counties and city will jointly construct seven miles of good road from this city to Cloverdale in Botetourt County; State funds available will be used on the new road; right-of-way is 40 feet wide and the road is to be 16 feet wide and will cost $20,000. Road will be built by convict labor.—W. B. Bates, City Engineer.

Everett, Wash.—County Commissioners will call for bids for the construction of the first mile section of the Mukilteo-Everett road.

Puyallup, Wash.—Council has adopted a resolution providing for the paving of portions of Meridian, Pioneer, Stewart and J streets; estimated cost, $65,000.

Puyallup, Wash.—Citizens will vote May 25 on $20,000 street improvement bonds.

Spokane, Wash.—The Board of Public Works has submitted to Council plans for grading, curbing and sidewalking Providence avenue; estimated cost, $18,000; for Lacey street, estimated cost $6,400, and Addison street, an area of 517,200 square feet, estimated cost $8,400; plans are completed for grading, curbing and sidewalking LaCrosse avenue, estimated cost $9,000; Webb place, estimated cost $900; Dean avenue and Hollis street, estimated cost $2,700; Council has instructed the Board of Public Works to prepare plans and specifications for grading, curbing and sidewalking, with cement, of the following; Eighth avenue, Hatch street, Sinto avenue, D street to the Spokane River; plans are completed for grading, curbing and sidewalking of Wall street, and will be submitted to Council for approval; estimated cost, $12,000.

Vancouver, Wash.—Government has appropriated $20,000 for the improvement of Reserve street.

Walla Walla, Wash.—Council is considering specifications for macadamizing Crescent street.—City Engineer Loehr.

Beloit, Wis.—Rock County will expend $14,000 for good roads.—L. E. Gettle, Edgarton, Chairman Committee on Distribution of Road Money.

Green Bay, Wis.—Council is considering extension of Mason street.

Edmonton, Alta., Can.—Council has authorized the bitulithic paving of 38,896 square yards of city streets; estimated cost, $166,€88.

Prince Albert, Sask., Can.—Council has passed estimates for $50,000 to provide for paving all the business streets.

Winnipeg, Man., Can.—Council will expend over $500,000 this year in laying asphalt pavements.—H. N. Ruttan, City Engineer.

BIDS RECEIVED AND CONTRACTS AWARDED

Birmingham, Ala.—The bid of C. M. Burkhalter under Improvement Ordinance No. 439, new series, for grading, combined curb and gutter and storm sewer, for the sum of $5,570 has been accepted, same being the lowest bid submitted. The bid of the Birmingham Paving Company for sidewalk paving under Improvement Ordinance No. 439, new series, for the sum of $1,865, has been accepted, same being the lowest bid submitted.

Huntsville, Ala.—The Mineral Rubber Paving Company, of Memphis, secured contracts for paving Meridian Street and Randolph Street.

Redlands, Cal.—Bids were opened for the macadam paving of Fourth and Eureka streets, from Home Place to Brookside avenue and Vine street; two bids were offered on each, those of the Highway Construction Company being the lowest and the contract being awarded to this company. The price is $.06499 per square foot for the macadam pavement, of which the city is to pay one-half and the property owners one-half. Ernest Frenzell bid $.0722 on Fourth street and $.0719 on Eureka street.

New Haven, Conn.—V. Ferrie & Co. have secured contract from Henry D. Whiting, of Hartford, owner of the Gorham property on Dixwell Avenue, to put an artificial stone walk and curbing around the property. The contract totals about 50,000 square feet.

Washington, D. C.—Bids were received as follows April 24 by the Commissioners of the District of Columbia for grading Massachusetts avenue, between Wisconsin and Nebraska avenues: Drake & Stratton Company, Philadelphia, 29 cents per cubic yard; George Hyman, Washington, 21¾ cents; James J. Overn, Washington, 22.4 cents; Fisher & Carozza, Baltimore, 23.5 cents; James W. Bean, Washington, 22 cents; E. Saxton, Washington, 24.4 cents; E. G. Gummel, 24 cents.

Wallace, Ida.—Bids for paving were received April 19 as follows: Barber Asphalt Paving Company, Spokane, Wash.—21,708 square yards of sheet asphalt at $2.30; 1,035 square yards concrete gutters, $2; 3,790 cubic yards of excavation, $1.10; 1,494 linear feet 4 by 12 header blocks, 40 cents. Warren Asphalt Paving Company, Portland, Ore.—Same yardage, sheet paving, $2.50; concrete gutter, $1.80; excavation, $1; header blocks, 40 cents.—Henry M. Lancaster, City Engineer.

Cairo, Ill.—L. M. Johnson has been awarded contract for constructing vitrified brick pavement with combined concrete curb and gutter and brick catch basins on Thirty-fourth Street for $19,069. George Parsons, President, Board of Local Improvements.

Contract calls for 8,344 square yards of brick pavement on 1:3:6 concrete, 5 inches thick, for $1.93 per square yard; excavation, 30 cents per cubic yard; totals of the bids received were: Roy L. Williams, $19,601.06; A. S. Fraser, $20,226.69; Garner & Hanes, $20,661.11; R. E. Gannon, $19,583.45. —W. B. Thistlewood, City Engineer.

Lafayette, Ind.—A contract was let April 21 for 600 linear feet of 5-foot sidewalk, including 5 feet of sodding between sidewalk and curb, at 43 cents per running foot. John B. Truman, City Engineer.

Marengo, Ia.—James Horrabin, of Des Moines, has secured contract for paving about 23,000 square yards with brick at $1.64 per square yard, or a total of $40,000.

Topeka, Kan.—The contract for 15,000 square feet of cement sidewalks in Elmhurst was let April 16 to E. E. Crauch, the walks to be laid on both sides of Mulvane street, and on Huntoon street, from College to Garfield avenues; walks will be laid on the other streets as soon as this work is completed.

Lexington, Ky.—Superintendent Bateman, of the Board of Public Works, opened bids April 24 for furnishing 5,000 tons of crushed rock, to be spread on the city streets. The bid of the Home Construction Company of $1.25 per ton, being the lowest and best, was accepted. A large part of this rock will be used in repairng streets in various parts of the city, and some of it will be put on the 14 new streets that are to be constructed.

Louisville, Ky.—L. R. Figg & Co. and W. G. Gosnell were awarded contracts by the Board of Public Works for street reconstruction, aggregating $10,300. The work is to be done with vitrified brick. L. R. Figg & Co. got the contract for Wenzell Street from Main Street to Market Street, and Grayson Street from Sixth Street to Seventh Street, while G. W. Gosnell will reconstruct Brook Street from Green Street to Walnut Street.

New Orleans, La.—The Barber Asphalt Paving Company, of Louisville, Ky., and Philadelphia, Pa., was the lowest bidder for paving of Carrollton Avenue, and Bancroft & Ross, of New Orleans, for remainder of contract; four miles of Carrollton Avenue will be paved.

Opelousas, La.—Huston & Cunningham, Consulting Engineers, 725 Maison Blanche Bldg., New Orleans, contractors for constructing about 35,000 square feet of cement sidewalks and 7,000 lineal feet brick curbing, have sublet contract to J. E. Allen, city. Estimated cost, $10,000.—M. Halphen, Mayor.

Boston, Mass.—Estimates ranging from $63,965 to $98,860 were received at the offices of the Charles River Basin Commission for surfacing and grading that section of the Boston embankment which extends from the Cambridge Bridge to Berkeley street. Work will begin within a week after the contract has been awarded and is to be completed by November 1. The estimates submitted were as follows: T. H. Gill Company, $63,965; Frank H. Cowen Company, $64,915; Fred E. Ellis, $70,917; Coleman Brothers, $71,485; Rowe Contracting Company, $74,904; Bruno & Petitti, $82,005; James T. Barrett, $92,762; J. L. Falvey, $92,325; Kelley & Long, $98,860.

Bay City, Mich.—Council has confirmed the awarding of the contracts for asphalt pavements to the J. F. Hill Company by the Board of Public Works; and the company has closed a deal with Hugh Campbell & Son to do the concreting and other similar work, and will install in the city a modern plant and will have it centrally located, so as to be easy of access: this plant will cost about $25,000. Five streets are to be covered with asphalt, against one with brick, the asphalt streets being McKinley from Water to Trumbull Street, Jackson from Center to Columbus Avenue; Fifth Avenue, Johnson Street to Park Avenue; Grant Street, Center Avenue to Ninth Street; Lincoln Avenue, Sixth Street to McKinley Avenue. The only brick pavement will be on Sixth Street from Water to Jefferson. Two other streets are to be paved this year, according to present indications—Madison Avenue from First to Belinda Streets, and State Street. The Board of Public Works decided to make a test of brick before ordering the paving of these streets, several different kinds of material being specified in the proposals. The contracts awarded are as follows:

ASPHALT.

McKinley Avenue, J. F. Hill	$36,268.66
Jackson Street, J. F. Hill	16,785.21
Fifth Avenue, J. F. Hill	20,401.80
Grant Street, J. F. Hill	8,215.02
Lincoln Avenue, J. F. Hill	5,530.90

BRICK.

Sixth Street, P. Ryan & Son	6,211.95
Total	$93,323.54

Detroit, Mich.—The contract for the city's supply of creosote block, amounting to 100,000 square yards, has been awarded to the Kettle River Quarries Company at $1.73 per square yard.

Albert Lea, Minn.—Contract for 9,236 square yards paving has been awarded to Fielding & Shepley, of St. Paul, for $22,075.—William Barneck, City Engineer.

Kansas City, Mo.—The Board of Public Works April 20 opened bids as follows for paving portions of (a) Thirty-eighth, (b) Tracy and (c) Thirty-seventh streets: Barber Asphalt Paving Company, Colonial Security Bldg., a $2.16, b $2.02, c $1.99, and Parker Washington Company, 2309 Penn avenue, a $1.78, b and c $1.83.

St. Charles, Mo.—Bull & Ueberle have been awarded a contract for laying 6,570 linear feet concrete curb and gutter for 51 cents a foot; also for 25,155 square feet cement sidewalk, 4 inches thick on 8-inch cinders for 13 cents; also for 2,153 cubic yards of grading at 30 cents. The totals of all bids for curbing were: Bull & Ueberle, St. Charles, Mo., $3,350.70; G. S. Hackmann and John Wetter, city, $3,580.62; J. A. Bottani, city, $3,777.75; D. W. Duncan, Sullivan, Ill., $3,482.10. Totals of all bids for sidewalks were: Bull & Ueberle, $3,270.15; G. S. Hackmann and John Wetter, $3,647.48; J. A. Bottani, $3,647.48; D. W. Duncan, $3,333.03.—Carr Edwards, City Engineer.

Belleville, N. J.—Awards of contracts for paving and curbing five sidewalks were made by the Township Committee April 27; the work to be done will cost altogether $10,224.46; a contract was also awarded for supplying broken stone for repairing the roads, the price being $1.60 a ton; the successful bidder was F. J. Marley. For the sidewalk work on Honiss, Clinton and Dow streets, Maher & McNichols, of Kearny, received the contract. This firm was also the lowest bidder on the Magnolia street work, but their proposal was declared informal. Jannerone Brothers, of Belleville, received the Magnolia street job and the Anthony F. Gerber Stone Company of this city the Heckel street contract. For supplying the broken stone, Wright & Lindsley bid the same as Marley; the contract was given to the former because he supplied the stone last year and the officials were satisfied with his work.

Hackettstown, N. J.—The Road Committee of the Warren County Board of Freeholders has received bids for the new State road to be built between this place and Port Colden, a distance of eighteen and one-half miles. The road builders were asked by the State Road Supervisor to bid on three kinds of construction, macadam, amacite and asphalt. The following were the bidders and the prices estimated in the order of the grades above named:

John Ginder, of Trenton, $54,192.63, $63,008.92 and $88,086.86; Sutton, Coursen & Co., of Ocean City, $69,526.62, $80,811.50 and $110,434.28; Kinston Construction Co. of Wilkes-Barre, Pa., $96,759.69 and $107,339.26; Salmon Brothers, of Hackettstown, $60,437.79, $71,722.66 and $92,176.49; Bushkill Quarry Construction Co. of Easton, Pa., $60,956.76, $71,536.33 and $103,274.99; Miles-Tighe Co., Easton, Pa., $73,382.55 and $79,730.29; B. M. Shanley Son & Co., of Newark, $67,970.41, $76,454.06 and $80,685.89; E. C Humphrey & Co., of Hackensack, $67,306.86, $79,296.54 and $120,204.19; George M. Frech, Easton, Pa., $70,534.90, $88,167.51 and $112,853.16; Charles Silery and James Rivo, $75,019.83, $92,650.44 and $120,864.62; E. D. Bakin, of Binghamton, N. Y., $56,907.74, $66,076.40 and $93,467.66.

A special meeting of the Board of Freeholders is called to be held soon and the Road Committee will present the above bids to the Board for awarding the contract, and making the appropriation for the county's share of the cost of the road's construction.

Newark, N. J.—Resolutions awarding the contracts for the paving of five streets were adopted by the Board of Works as follows: For the paving with brick of Pearl Street, between Washington Street and Chapel Court, and Shipman Street between Springfield Avenue and Washington

Street, to the Newark Paving Company; Garrison Street with bitulithic from Hamburg Place to Elm Road, to the Standard Bitulithic Company; New York Avenue, between Van Buren and Garrison Streets, with bitulithic, to the same company; Chapel Court, from Pearl Street to William Street, with brick, to J. F. Shanley.

North Bergen, N. J.—Bids for the improvement of Thirty-eighth and Thirty-ninth streets were received from John F. Murphy, Peter Brunner, Thiel Contracting Company, John Lenahan; with the exception of the Thiel Company the same contractors presented bids for the improvement of Oak street. The bids were referred to the committee of the whole.

Woodbine, N. J.—A contract for the grading and graveling of the streets and sidewalks has been awarded to Simon Brallove.

Brooklyn, N. Y.—The Brooklyn Alcatraz Asphalt Company, 407 Hamilton avenue, has secured contract for paving with asphalt on concrete foundation Fifth avenue from Bay Ridge avenue to Eighty-sixth street, at the following bid: 14,110 square yards asphalt pavement, outside railroad area, five years' maintenance, $1.04; 2,070 square yards asphalt pavement, within railroad area, no maintenance, $1.04; 1,980 cubic yards concrete, outside railroad area, $5.40; 310 cubic yards concrete, within railroad area, $5.40; 350 lineal feet new curbs, set in concrete, $1; 490 lineal feet old curbs, reset in concrete, 75 cents; three noiseless manhole heads and covers, $16; total, $29,959. Totals of other bids: Barber Asphalt Paving Company, 30 Church street, New York City, $33,744; Cranford Company, 190 Montague street, Brooklyn, $30,031; Uvalde Asphalt Paving Company, 1 Broadway, New York City, $34,165; Warren Asphalt Paving Company, 93 Federal street, Boston, Mass., $34,751; Standard Asphalt Company, 115 Broadway, New York City, $32,429.

Following are the totals of bids opened April 22 by the Park Commissioners of New York City for furnishing and delivering crushed trap rock and trap-rock screenings on parkways in Brooklyn Borough: Jos. A. Boyce, 847 Boulevard, Long Island City, $11,086; Robert Carter & Company, 551 Prospect place, Brooklyn, $12,-917; Clinton Point Stone Company, 115 Broadway, New York, $11,070; Jacob E. Conklin, 299 Broadway, New York, $11,070, and Manhattan Trap Rock Company, 114 Liberty street, New York, $11,302.

The following are the totals of bids opened same time and place for limestone and limestone screenings in parks and parkways in Brooklyn and Queens Boroughs: Robert Carter & Company, 551 Prospect place, Brooklyn, $7,387; Clinton Point Stone Company, 115 Broadway, New York City, $7,375, and Norton & Gorman Contracting Company, 303 Douglass street, Brooklyn, $6,850.

Elmira, N. Y.—The Board of Public Works has let contracts for construction work as follows: Henry P. Holleran, cement crosswalks, at 14⅜ cents per square foot; Herman Vogel, at 9¾ cents per square foot for cement sidewalks, also 18 cents per square foot for stone sidewalks.

Fulton, N. Y.—At a meeting of the Board of Public Works April 23, at which Special Commissioners Lawrence Van Buren, E. E. Taylor, C. E. Wilson and E. L. Jennings were present, all bids received on April 19 for street improvement were rejected. The proposals submitted by the firm of Simpson & Willis, of Erie, Pa., was acceptable to the Board, but the contracting company asked that it be allowed to withdraw its bid for the reason that the item relating to trap rock to be used in the paving was overlooked, and the estimate was based on the use of limestone instead of the materials specified by the Board. Bids were received for improving Oneida, South First, Hannibal, West Third streets, Oswego Falls road and East Broadway, the work to consist of 32,000 square yards trap rock macadam pavement, 7,750 square yards vitrified pavement and crosswalks, 18,600 lineal feet cement curb, 4,800 lineal feet storm sewer 10 to 20 inches, 20,000 square surface yards grading roadway and 42 storm sewer manholes and inlets. The work is subdivided into nine sections and bids were submitted on separate sheets for each section as follows: On all nine sections: Simpson & Wallis Company, Erie, Pa., bid a total of $60,061; Bonn & Hookway, Syracuse, $97,-558; Busch & Perceval, Buffalo, $73,929; and Thomas Fitzgerald, Fredonia, $77,157. John Hendrick, Oswego, bid for sections 3, 4 and 9, $15,438, $12,859 and $7,884, respectively; John Young, Syracuse, for sections 1, 2, 4, 5, 6, 7 and 8, $15,596, $7,812, $17,599, $4,029, $12,199, $12,156 and $4,462, respectively. Utica Construction Company, Utica, for sections 1, 2, 4, 5, 6, 7 and 8, $13,682, $6,597, $14,967, $3,368, $10,046, $9,424 and $3,716. Haverin & Dwyer, Utica, for sections 3 and 9, $14,969 and $7,694, respectively, and Peter Massaro, of Fulton, for sections 3 and 4, $17,573 and $14,150.—O. C. Breed, City Engineer.

Gloversville, N. Y.—Engineer William O. Drake has secured contract for the Conley Brothers' Construction Company, of Ithaca, for 21,000 square yards brick paving, 4,000-ft. sewer and 10,500 ft. curb; there were several other bidders, but the Conley bid was the lowest at $62,400.

Harrison, N. Y.—Tony Richards was awarded a contract, April 23, for laying 19,200 square yards of brick pavement 4 inches thick on a 1:3:5 concrete foundation 6 inches thick, sand cushion 2 inches, for $2.36, including 7,200 cubic yards of excavation through three-fourths rock included in the brick price; also for resetting 50 feet of old curb, 35 cents, and concrete and setting, 8,700 feet of straight curb and concrete 84 cents; 450 feet curved curb, $1.06; 825 feet marginal curb, 57 cents. Totals for all bids were: Tony Richards, White Plains, $63,614; Eidridge & Grannis, Ossining, $63,997.54; United Paving Company, Atlantic City, N. J., $65,757.39; Antonio Vignola, Harrison, N. Y., $66,514.25; A. R. Tibbs Construction Company, Mount Vernon, N. Y., $68,527.67; William J. Stockton, Harrison, $68,530.80; Wormser, Goodman Construction Company, New York City, $69,491.80; John O. Merritt Company, Port Chester, N. Y., $69,750.38; Mulderry Bros., Albany, N. Y., $70,873.50; Sillery & Piro, Mount Vernon, N. Y., $71,-306.15; Bellevue & Merritt Construction Company, Tuckahoe, N. Y., $74,137.56; John R. Baxter, Jr., Utica, N. Y., $74,-255.20; Decicco Construction Company, Larchmont, N. Y., $76,389.15; W. H. Arthur, Stamford, Conn., $76,663.20; Frank E. Murray Construction Company, Port Chester, N. Y., $76,832; James E. Martin, Poughkeepsie, N. Y., $87,978.45; Bart Dunn, New York City, $88,763.30; Hassam Paving Company, New Haven, Conn., $90,-916.36; William H. Driscol, Port Chester, N. Y., $93,342.06.—John M. Farley, White Plains, Engineer.

Little Falls, N. Y.—Patrick D. Conley, of Ithaca, has secured the contract for paving with Mack brick portions of North and South Main streets, in all about 21,000 square yards, for $65,119.

Rochester, N. Y.—Low bidders on public improvements were: Plymouth avenue asphalt pavement, Whitmore, Rauber & Vicinus, $35,588.50; Brown street asphalt pavement, Rochester Vulcanite Pavement Company, $22,768; Culver road asphalt pavement, Whitmore, Rauber & Vicinus, $15,743.50; Nicholas street brick pavement, Hagaman, Miller & Hagaman, $3,868; Lake View Park trap rock pavement, H. N. Cowles, $18,728; Troup street cement walks, H. B. Hooker & Son, $416.25; sweeping and cleaning Hawley street, Philip E. Yeoman, $10.40 a week, contract let on majority petition; Goodman street resurfacing, H. C. Schroeder, $3,845; Mount Vernon avenue brick pavement, H. C. Schroeder, $18,958.50.

Utica, N. Y.—The Barber Asphalt Paving Company has the contract for repairing asphalt pavements at $1.25 per square yard.

Utica, N. Y.—Following is summary of bids received April 27 by the Board of Contract and Supply for paving on various streets: Jay street, asphalt pavement with artificial stone curb and sidewalks, $6,-484.10; asphalt pavement with sandstone sidewalks, $6,851.70. Square street, asphalt pavement with artificial curb, $4,-766.45; asphalt pavement with stone curb, $5,030.45. Fulton street, asphalt pavement with artificial curb, $2,440; asphalt pavement with stone curb, $2,431.20. Kernan avenue, asphalt pavement with artificial stone curb and sidewalks, $4,007.05; with sandstone curb and sidewalks, $4,285.65; figures are based upon estimates of quantities furnished by the City Engineer.

Bridgeport, O.—The contract for furnishing the paving brick for Lincoln Avenue has been awarded to the Standard Brick Co., of Bellaire; the contract for laying the brick and labor was awarded to Crowner C. Cochran.

Cincinnati, O.—The County Commissioners have let the contract for the improvement of Madisonville pike, from Madisonville to Oakley, to Contractors Silver and Garretson, whose bid was $16,840.90; ten other contractors submitted bids on the work; the Surveyor's estimate was $22,-260.50.

Other contracts were awarded by the Commissioners as follows: Improvement of Crosby avenue, from Highland avenue to Madison road, Sycamore Township, W. Taulman, $1,422.20; improvement of Given road from the Little Miami River 1,500 feet south, Symmes Township, W. Taulman, $1,418.50; bridge on Pittman road, east of the Miami Canal, Sycamore Township, William Keller, $138.40; concrete culvert in Brecon road, near Runyan Schoolhouse, Sycamore Township, J. F. Shanklin, $457; repair of wing wall of bridge on McCullum road, near Camargo pike, Columbia Township, William Keller, $163.10; repair of abutments of bridge on the road running from Newtown to Clough pike, Anderson Township, S. E. Maxfield, $103; new superstructure on Eagle Creek road, near Harrison pike, Colerain Township, J. Fagaly, $357.50.

Cincinnati, O.—A contract was let to the Kirchner Construction Company at $4,-679.40 to improve Barr street from the east line of Cutter street to the west line of Mound street with asphalt paving, concrete curbs, gutters and openings. They were also awarded the contract at $4,672.38 to improve Kenyon street from the east line of Cutter street to the west line of Mound street with asphalt paving and concrete curbing.

John Funke & Company have secured the contract for laying cement walks, grading approaches, etc., under Eighth street viaduct from end to end.

Columbus, O.—The Board of Service has allowed the following contracts: Paving Lynn Street from Ludlow to Water, W. E. Schwartz, $1,051; sewer, Ogden Avenue, to E. H. Ames, $2,870.05; sewer, Town Street, J. C. Beasley, $2,386.60; improving alley west of Warren Avenue, E. H. Ames, $6,344.30; improving alley east of Studor Avenue, L. Lind, $629.30. The work on all of these contracts will begin at once. The contract for the resurfacing with asphalt Oakwood Avenue from Main to Schiller Street will probably be let to D. E. Sullivan & Son. Their bid for the work amounted to $39,158.40, which was the lowest given, and there is little question that they will be given the contract. The street will be covered with Trinidad asphalt.

Springfield, O.—The Board of Public Service has awarded contracts for paving portions of Fountain avenue as follows: With asphalt block between Pleasant street and Perrin avenue to Toledo Asphalt Block Company for $32,127; with Bolan brick between High and Washington streets, Washington and Jefferson streets and Pleasant and Jefferson streets to W. F. Payne at $9,778, $4,660 and $6,873, respectively.

Youngstown, O.—Bids were opened by the Board of Public Service for paving La Salle avenue and Fruit street. The lowest bidder for the La Salle avenue work was Martin Fleming, at $6,709; for Fruit street

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Tomah, Wis.—The following bids were received, April 16, for the pavement of Superior Avenue, John W. Alvord and Charles B. Burdick, Engineers:

BIDDER	Pavement	Excavation	Curb and Gutter	Plain Curb	Gutter Plates	Inlets Complete	15″ Pipe	12″Pipe	10″ Pipe	8″ Pipe	Total Bid
Thos. E. Woolley, La Crosse	$1.16	$0.15	$0.35	$0.35	$3.75	$15.00	$1.00	$0.50	$0.40	$0.30	$37,057.55
Abell & Braley Co., Winona	1.19	.17	.49	.34	7.50			325.00			39,120.52
Engineer's Estimate	1.25	.16	.50	.25	3.00	15.00	.60	.50	.40	.30	40,377.25
Sweeney Bros., Reedsburg	1.25	.25	.48	.26	3.00	.750	.60	.40	.30	.30	40,646.18
J. Rassmussen & Sons Co., Oshkosh	1.26	.25	.46	.28	3.00	10.00	.75	.60	.45	.40	40,984.34
Donn & Mead, Cleveland, Ohio	1.25	.25	.52	.38	5.00	10.00	.68	.50	.38	.29	41,841.95
Holman & Davisson, Rochester, Ind	1.30	.20	.50	.33	3.50	5.50	1.50	.60	.50	.40	42,281.09
Forrestal & Feyen, St. Paul, Minn	1.23	.25	.60	.37	6.00	20.00	.70	.50	.50	.40	42,399.71
Hockworthy Construction Co., Appleton	1.26	.25	.53	.35	10.00	18.00	.75	.60	.50	.45	42,872.00
E. L. Bartlett, Watertown	1.36	.20	.50	.38	.75	15.00	.60	.40	.30	.30	43,771.04
E. R. Harding & Co., Racine	1.34	.22	.55	.32	8.00	10.00	.65	.55	.45	.40	44,418.46
Wm. O'Donnell, Milwaukee	1.65	.40	.54	.45	20.00	30.00	3.00	2.00	2.00	2.00	57,278.15

paving, Martin P. Connelly, at $6,889, was low bidder.

Youngstown, O.—The Board of Service has awarded the contract for the paving of Fruit Street to Martin Connelly; the pavement will be brick with a cement filler.

Youngstown, O.—The Good Roads Commissioners of District No. 1 have received bids for the construction of a section of macadamized highway on the Bears Den road in Youngstown Township. Joseph Collucci is the lowest bidder among seven who turned in estimates on the work. His bid was $7,561.40. The other bidders with their estimates were: L. H. Young, $8,432; Ross O'Rourke, $7,700; Joseph Hannon, $9,814.80; E. E. Miller, $8,611.14; G. A. Galdini & Co., $7,777; George W. Ripple, $7,593.70.

Portland, Ore.—Acting on the advice of City Attorney Kavanaugh, the City Executive Board has rescinded its action awarding the contract to the Montague-O'Reilley Co. for paving a large district in North Portland with Belgian blocks. This action was recommended on the ground that the contract had been awarded to the contracting firm before it was incorporated and that such action was illegal, as there was no responsible firm of the name mentioned at the time the contracts were authorized. W. M. Davis protested against the awarding of the contract and Mayor Lane withheld his signature pending the opinion of the City Attorney.

Butler, Pa.—Butler brick has been adopted for Pearl and Walnut Streets, as it is considerably cheaper than any other brick, especially to this city. The following are the bids for the paving of the two streets, the bids, as in the past several weeks, being very close between several contractors: East Pearl Street from Oak to Third Street; F. M. Harper—Brick, $1.32 a square yard; cement curb, 59 cents; excavating, 29 cents; pitch filling, 14 cents; resetting curb, 16 cents. F. E. McQuistion—Brick, $1.16; curb, 58 cents; excavating, 31 cents; pitch, 13 cents; reseting curb, 25 cents. N. J. Boyer—Brick, $1.11; curb, 70 cents; excavating, 35 cents; pitch, 12 cents; resetting curb, 25 cents. Tony Morelli—Brick, $1.24; curb, 61 cents; excavating, 34 cents; pitch, 14 cents; resetting curb, 25 cents. John Schaffner—No price on Butler brick. Burns Bros.—Brick, $1.24; curb, 60 cents; excavating, 31 cents; pitch, 14 cents; resetting curb, 30 cents. Walnut Street: McQuistion—Brick, $1.09; curb, 58 cents; excavating, 30 cents; pitch, 13 cents. Morelli—Brick, $1.10; curb, 59 cents; excavating, 31 cents; pitch, 13 cents. Harper—Brick, $1.05; curb, 65 cents; excavating, 28 cents; pitch, 14 cents. Boyer—Brick, $1.05; curb, 70 cents; excavating, 30 cents; pitch, 12 cents. Burns Bros.—Brick, $1.19; curb, 60 cents; excavating, 33 cents; pitch, 15 cents. Schaffner—Brick, $1.05; curb, 59 cents and 70 cents; excavating, 29 cents; pitch, 12 cents. The paving of this street will be 18 feet in width, with an 18-inch curb and gutter, the street to be paved from McKean to Elm Street. The bids were referred to the paving committee and the engineer to award the contract. N. J. Boyer, who received the contract for the paving of a portion of Oak Street, was given the contract for the paving of a further section of the street, using the same material as the former contract.

Erie, Pa.—Mayer Bros. were awarded the contract for repairs to asphalt pavements at a joint session of Councils. Only two bidders tried for the work, John McCormick & Son and Mayer Bros. Their prices per square yard were as follows:

	Mayer Bros.	McCormicks.
Trinidad, Class B.....	$0.95	$1.05
Trinidad, 1½-inch top.	.95	1.00
Trinidad, Class C.....	.95	1.00
Sun or other asphalt...	.85	.85
Concrete base and grading	1.25	1.25

City Engineer Briggs stated that different bids had been asked because many of the pavements to be patched this year would only require asphalt toppings that would last two or three years because they were almost worn out. The bids, he said, were 44 cents per square yard cheaper than last year.

Franklin, Pa.—Contracts for the paving of several streets and the Halyday Street sewer were let by Councils: The Vetter Construction Company, of Meadville, was given the contract for the paving of East Third Street, Short Street alley and Second Street alleys Nos. 1 and 2, Bissell Avenue from Harriot to Seeley Avenue. The specifications call for grading, paving and curbing of East Third Street; Bessemer brick, with gravel base, pitch filler and concrete curbing; the Short Street alley and Second Street alley No. 1 are to be paved with Bessemer brick, while Second Street alley No. 2 is to be paved with McNee's brick; Bissel Avenue is to be paved with Toronto brick, a concrete base to be used between Harriott Avenue and the street car trestle, and the remainder to be based of gravel with pitch filler and concrete curb. Burns Brothers, of New Castle, were given the paving, grading and curbing of East and West Front Street and a part of Short Street. The specifications require Toronto brick with concrete base, pitch filler and stone curbing. This firm was also awarded the contract for the construction of the Halyday Street storm sewer and the Colbert Avenue sewer. The bid for lumber and sidewalks for the city of the Borland & Diamond Lumber Company was accepted by Councils.

Lebanon, Pa.—The Highway Committee of City Councils opened bids April 29 for highway supplies for the year 1909. The following awards were recommended to be made by Councils:

Crushed limestone, Imboden and Hay, at 73 cents a ton; steel culvert plates, Union Boiler Works; lumber, Miller Brothers; resetting old curbs, Winfield S. Bock; brick paving for sidewalks, Samuel Bell's Sons; asphalt paving, W. S. Bock; vitrified brick paving, W. S. Bock; gutter stone, W. S. Bock.

The detailed bids were opened and read as follows:

Curbing—W. S. Bock, sole bidder, new curbing, 3 inches thick, 31 cents per linear foot; 4 inches, 43 cents; 5 inches, 53½ cents; 6 inches, 75 cents; old curbing, 9 cents a foot.

Paving sidewalks with brick—W. S. Bock, 13½ cents per square foot, kind of brick not specified; Samuel Bell's Sons, 10¾ cents per square foot, kind of brick not specified; Peerless Brick Co., 10 cents per square foot, shale brick specified; contract recommended to be awarded to Bell's Sons.

Asphalt block paving—W. S. Bock, sole bidder, new, 22½ cents per square foot; relaying old, 3¼ cents per square foot; cobble, new, 8½ cents per square foot; relaying old, 3¼ cents per square foot.

Vitrified brick—W. S. Bock, paving, 14 cents per square foot; cobble, new, 8½ cents per square foot; relaying old cobble, 3¼ cents per square foot; Samuel Bell's Sons, paving, 15 cents per square foot; cobble, new, 8 cents; relaying old cobble, 4 cents; contract recommended to be awarded to W. S. Bock.

Gutter stone—W. S. Bock, sole bidder, 12 inches wide, 10½ cents per square foot; 26 inches wide, 10½ cents; 30 inches wide, 10½ cents.

Crushed stone—E. H. Brensinger, No. 1 and No. 2, 78 cents per ton of 2,240 pounds; Imboden & Hay, No. 1 and No. 2, 73 cents per ton of 2,240 pounds; both bidders agreeing to furnish 50 tons a day; contract recommended to be awarded to Imboden & Hay, the city, however, to buy of E. H. Brensinger a quantity of stone already crushed by him specially for a Mifflin street repair job, at the contract price paid in 1908, 73 cents per long ton.

Steel culvert plates—Union Boiler Works, for various sizes, $1, $1, $1.05, $1.10, $1.15, $1.20 and $1.25. The Standard Boiler Works submitted a bid, but it was not accompanied by a bond and was not received.

Lumber—Miller Bros., sole bidders, hemlock boards, $27 per thousand feet; planks, $25; scantling, $25; white pine boards, $40; planks, $40; scantling, $35; white oak planks, $32.

The brick paving job may be a large one, as Mayor Marquart proposes to compel unpaved or badly paved sidewalks to be paved or repaved, respectively. The city will do the paving in cases where private owners fail to do the work.

Zelienople, Pa.—Town Council has let the contract for paving Main street, the successful bidders being Maynerd & Flinn of Pittsburg, and Mack block, a paving brick made at New Cumberland, W. Va., was chosen. Below are the quotations from a few of the lower bidders. The stone curb as well as the cement curb and gutter were bid on by the linear foot, the excavating by the cubic yard and the paving by the square yard.

Maynerd & Flinn—Stone curb, 54 cents; cement curb and gutter, 47 cents; excavating, 30 cents; paving with Mack block, $1.30.

J. C. Devine, Alliance, Ohio—Stone curb, 49 cents; cement, 55 cents; grading, 25 cents; paving, $1.35.

J. H. & M. E. Miller, New Castle—Stone curb, 52 cents; cement, 55 cents; grading, 30 cents; paving, $1.33.

F. J. Erbeck, Homestead—Stone curb, 58 cents; cement, 75 cents; grading, 35 cents; paving, $1.28.

D. Sullivan, New Castle—Stone curb, 62 cents; cement, 65 cents; grading, 32 cents; paving, $1.38.

Rhodes & Meyers, New Castle—Stone curb, 60 cents; cement, 68 cents; grading, 31 cents; paving, $1.32.

Among the other thirteen bidders the highest bid on stone curb was 70 cents, the highest on cement curb and gutter 85 cents, highest on grading 35 cents, highest on paving with Mack block $1.56.

Woonsocket, R. I.—Council has recently awarded A. Newell, Jr., of Manchaug, the contract for furnishing the curbing, his bid being the lowest of several received. The bids were as follows: A. Newell, Jr., $1,064.75; Lataille & Jacques, North Uxbridge, $1,170; Blanchard Bros. Company of Linwood, $1,179; H. S. Taft, Providence, $1,192.50; John Lacourse, Geneva, R. I., $1,373.75.

Chattanooga, Tenn.—A. F. Hickman, 221 Temple Court, has awarded contract to West Construction Company. 1001 Market Street, city, at $725, for construction of Chert Street with concrete curb and sidewalk.

Park City, Tenn.—Contracts for hauling, spreading, watering and rolling between 30,000 and 40,000 cubic yards of macadam have been let by the Park City Council. The lowest bidder, who was awarded about one-half of the work, is J. B. McTye. He agreed in the contract to haul, spread, water and roll 15,000 cubic yards of macadam, according to the specifications of the Street Committee and of the City Engineer, the work under his charge to be completed within 163 days atfer it is started, for $1.35 per cubic yard. Peters & Gibson bid $1.40 per cubic yard and were awarded one-half of the work under the specifications of the committee and of the City Engineer. Mr. McTye's bid being lower than that of the other firm awarded a contract, he was given the choice of the streets to be paved and improved; he selected the shortest haulage.

Boston, Tex.—The J. W. Maxcy Company, of Houston, has secured contract for construction of roads and bridges for Bowie County; cost, about $250,000.

Salt Lake City, Utah.—J. D. Hanley was given sidewalk extension No. 142 for $2,050.13 for replacing of the defective walks on East First South from Second to Sixth East, and on Fifth East from First South to Brigham street; excavating 900 cubic yards will cost 60 cents; cement pavement, 10,055 square feet 4-inch, at 13 cents, and 975 square feet 6-inch, at 17 cents.

Curb and gutter extension No. 8, on Fifteenth East, between First and Second South, also went to Hanley for $829.36; 570 linear feet plain 6x16-inch cement curb with 30-inch cement gutter, to cost 87 cents per linear foot.

Portsmouth, Va.—E. Parke Lindsay has been awarded a contract for building a macadamized road from Portsmouth to Deep Creek by the Permanent Road Improvement Commission of Norfolk County; Mr. Lindsay bid $5,476.90. He also submitted the same figures for completing the Jamestown Boulevard in Tanners Creek magisterial district and was awarded this contract as well.

Olympia, Wash.—Council has awarded contract for paving with brick and creosoted blocks portions of Fifth, Sixth, Franklin and Washington streets to the Mills Brothers, of Olympia, for $76,000.

Walla Walla, Wash.—The bid of Rich & Harris Construction Company for paving the seven districts on which estimates were received by Council April 22 has been found to be the lowest, City Engineer Loehr having tabulated the respective bids for consideration by the Street Committee; the tabulation shows the approximate cost for the seven districts quoted by the four representatives of competing paving companies. Following are the totals of the four bids for the seven districts, as calculated by the city engineer:

Rich & Harris Construction Company	$105,390.80
Rudolph S. Blome Company.....	116,990.44
Barber Asphalt Company.....	109,108.30
Warren Construction Company..	108,205.43

The seven districts to be improved by paving are as follows: District No. 37, West Main, from Ninth to O. R. & N. depot. District No. 38, North Second, from Mill Creek Bridge to Oak Street. District No. 39, North Third Street from Mill Creek Bridge to Elm Street. District No. 40, Rose Street Alley from Third to Fourth Street. District No. 41, Rose Street from Seventh to Colville Street. District No. 42, Spokane Street from Main to Rose Street. District No. 43, East Rose Street from Palouse to Colville Street. The great difference in the total bid between the Blome company and their competitors is due to the fact that the granitoid concern would enter a bid only on a 5-inch foundation and 1:3:4 mixture, while the asphalt companies worked on the 1:4:7 ratio. The Blome representative was not authorized to bid on different specifications, and it was feared the paving would not stand up well if placed on a lighter base, and with a different ratio of cement. They are as follows:

Warren Construction Company—Excavation, 50 cents per cubic yard; sewer construction, 6-in. sewer, 50 cents per linear foot; catch basins, $50 each; inlets, without catch basin, $12 each. Curbing,

concrete, 50 cents per linear foot; concrete, with angle irons, 60 cents per linear foot. Pavement, bituminous foundation, per cubic yard of stone used, $3.96; bitulithic surface, including surface finishing course, per square yard, $1.91; wooden stops, 30 cents per linear foot; monument cases, $10 each.

Barber Asphalt Company.—Excavation, 85 cents per cubic yard; sewer construction—six-inch sewer, 20 cents per linear foot; catch basins, $55; inlets without catch basins, $15 each. Curbing—concrete, 50 cents per linear foot; concrete with angle irons, 90 cents per lineal foot. Pavement—Asphalt per specifications on 4-inch base: 1:4:7 mixture, $2.25 per square yard; 1:3:6 mixture, $2.35 per square yard; 1:3:5 mixture, $2.40 per square yard; wooden stops, 50 cents per linear foot; monument cases, $10 each.

Rich & Harris Company.—Excavation, 80 cents per cubic yard; six-inch sewer, 25 cents per linear foot; catch basins, $50 each; inlet without catch basin, $15. Curbing—concrete, 50 cents per linear foot; concrete with angle irons, 90 cents per linear foot. Pavement—Asphalt on 1:4:7, $2.15 per square yard; on 1:3:6, $2.25 per square yard; on 1:3:5, $2.30 per square yard. This bid is on either stone or gravel in concrete base; wooden stops, 75 cents per linear foot; monument cases, $10 each.

R. S. Blome Company.—Excavation, 50 cents per cubic yard; sewer construction—sinx-inch sewer, 30 cents per linear foot; catch basin, $50 each; inlet without catch basin, $12 each; pavement—Blome Granitoid, $2.54 per square yard. For additional 5-year guarantee bond, making a total of 10 years, 15 cents per square yard; wooden stops, 50 cents per linear foot; monument cases, $10 ecah.

Seattle, Wash.—The contract for paving Eighth Ave. awarded to the Coast Concrete Company for $45,784.88. The paving contract for Thirty-second Ave. has been awarded to P. J. McHugh for $221,438.07, and $655.40 for maintenance. The contract for concrete walks on Brooklyn Ave. has been awarded to E. H. Rawle & Co., Walker Bldg., for $2,866.41.

The County Commisisoners have awarded the contract for the Wayne B. Carr road to Jacob Ambaum for $2,750.

Madison, Wis.—Contracts were awarded for street paving, April 28, as follows: Robert Mitchell, $52,515; William Keyes, $52,500; John Delancy, $7,305; John R. Cullinane, $3,609; George Nelson, $1,217.

Calgary, Alt., Can.—The Bitulithic & Contracting Company, Ltd., of Winnipeg, Man., has secured the contract for paving 4,500 square yards with bitulithic.

St. Catharines, Ont., Can.—The following bids have been received by the city for street paving: Blight & Fielder, Chatham, asphalt block, $81,887, recommended for award; Warren Bituminous Company, Toronto, bitulithic, $79,130; sheet asphalt, $74,237; R. Secord, Brantford, Westrumite, $64,805; T. Riley, St. Catharines, Johnsonburg brick, $76,465; Mack brick, $78,874, recommended for award; D. W. Mitchell Construction Company, Niagara Falls, Ont., Conneaut block, $74,468; Johnsonburg brick, $78,083; Mack brick, $82,672; asphalt block, $92,591; Westrumite, $70,755; Louis Gipp, Buffalo, Bessemer brick, $80,997; Elliott & Riley, St. Catharines, Westrumite, $71,431; Newman Brothers, St. Catharines, Penn brick, $72,982; Johnsonburg brick, $77,501; Mack brick, $79,911; asphalt block, $85,427.

SEWERAGE

Dothan, Ala.—Citizens will vote May 10 on $20,000 bonds for sewers and electric lights.

Dermott, Ark.—House has passed bill authorizing town to compel sewer connections.

Oakland, Cal.—Council has decided to sewer Nineteenth avenue from East Twenty-fourth to East Twenty-sixth streets.

Redlands, Cal.—The City Trustees have ordered a sewer constructed in Sylvena street.

Sacramento, Cal.—The Board of City Trustees has decided to reconstruct old sewers, also to construct new sewers to connect with present main trunks, at a cost of about $23,000.—Geo. N. Randle, City Engineer.

San Bernardino, Cal.—Council has ordered the construction of an 8-inch vitrified pipe sewer along Sixth street.

San Luis Obispo, Cal.—Citizens have voted to issue $60,000 bonds for extending the sewer system.—E. W. Clark is interested.

Denver, Col.—Plans for the proposed West and South Side Sanitary Sewer District will be finished within 60 days; main sewer will start at Broadway on the northern limits and follow the west side of the Platte to Alamenda; at this place it will branch to each side of the Platte, ending at the southern city limits near Yale street; total cost, about $700,000.—J. B. Hunter, City Engineer.

Holly, Col.—City will construct a sewer system to cost $25,000.—John Shull, of Holly, Engineer; N. F. Vidal, Town Clerk.

New Britain, Conn.—The Board of Public Works has submitted an order to Council for storm and sanitary sewers in Spring street; cost, $345.

Georgetown, Del.—Plans will be presented to Council for a complete sewer system.

Washington, D. C.—The Bureau of Insular Affairs of the War Department will receive bids on $1,000,000 of the sewer and water bonds of the city of Manila, May 10.

Barlow, Fla.—Citizens have voted $50,000 bonds for a sewerage system.

Evansville, Ind.—The Board of Works has ordered the construction of sewers on Jackson and Taylor streets.

Lafayette, Ind.—City Engineer John B. Truman is preparing plans and estimates for a new sewer which will cost in the neighborhood of $30,000; the size will vary from 15 to 40 inches; vitrified tile will be used for the smaller sizes and concrete for the larger.

Michigan City, Ind.—City Engineer H. M. Miles is preparing plans and specifications for a proposed main sewer in Tryon street; length, 2,000 feet.

Boone, Ia.—Preliminary surveys and estimates have been ordered for sewers in the Fifth Ward.—K. C. Kastberg, City Engineer.

Boone, Ia.—Plans are being prepared by City Engineer K. C. Kastberg for sewers west of Division street.—Otto Hile, City Clerk.

Davenport, Ia.—Property owners have petitioned for a lateral sewer on Mississippi avenue.

Muscatine, Ia.—Council has passed ordinance providing for the construction of a trunk sewer on East Hill; cost, about $16,000.—Jas. J. Ryan, City Engineer.

St. John, Kan.—Burns & McDonnell, Scarritt Bldg., Kansas City, Mo., have prepared plans for a municipal sewerage system.

Topeka, Kan.—Council has ordered the construction of a sewer in Huntoon and West streets and Munson avenue.—C. B. Burge, City Clerk.

Baltimore, Md.—The company controlling property at Severna Park will install a sewerage system and a sewage reduction plant; plans have been completed and bids will soon be asked.

Braintree, Mass.—Town is considering sewerage question; move has been made to construct a trunk sewer to connect with sewer of the Quincy system; cost, $36,000.—H. A. Mark, Town Clerk.

Gardner, Mass.—City has awarded $15,000 sewer bonds to the American Banking Company at $101.279.

Lenox, Mass.—Wm. Johnson, Boston, is investigating sewerage system and disposal plant and will make recommendations for improving same.

Quincy, Mass.—Council has passed an ordinance providing for an appropriation of $30,000 for sewer extensions.

Spencer, Mass.—Town will construct a trunk line sewer of pipe on Temple street; cost, $5,000.—E. E. Dickerman, Town Clerk.

Battle Creek, Mich.—Council has ordered $15,000 bonds issued; sewers will be constructed in Marshall, Maple, Chestnut, Wendell and Pittie streets.

Red Lodge, Mont.—Citizens have voted bonds for the installation of a sewer system.

Bayonne, N. J.—Council has passed ordinances for the laying of sewer and gas connections in Eighteenth and Twenty-sixth streets.—W. C. Hamilton, City Clerk.

Jersey City, N. J.—The Second Ward Improvement Association is urging the acquirement by the city of the old Mill Creek at Eighteenth and Erie streets as an additional sewer outlet.

Montclair, N. J.—Council is considering the construction of a storm water sewer in Claremont avenue and Walnut street.—Harry Trippett, Township Clerk.

Ocean Grove, N. J.—Borough is considering the connection of sewer mains with a sewer to cover West Grove and Bradley Beach; probable cost, $15,000.

Paterson, N. J.—The Manchester Township Bridge and Culvert Committee has requested County Freeholders for permission to extend pipe culvert on Washington avenue, Totowa Borough; cost, $475.

Princeton, N. J.—Governor Fort has signed bill for extension of sewer system.

Trenton, N. J.—The Commission appointed to investigate sewage disposal plants will visit several cities in order to obtain data.—J. O. Grettan, Chairman.

Brooklyn, N. Y.—Bids will be received May 5 for constructing brick and pipe sewers in a portion of Malbone street; estimated cost, $5,548.—Bird S. Coler, Borough President.

Buffalo, N. Y.—City is considering a $150,000 appropriation for lowering the trunk sewer outlet under the Black Rock Ship Canal.

Cape Vincent, N. Y.—Sanitary Engineer Horton, of Albany, has decided that while the system of sewerage in the village was not constructed, originally, along strict sanitary lines laid down by the State authorities, it is not necessary to disturb the whole system at once, but rather to construct new work as required and to gradually replace the old system with the new as fast as the public funds will allow.

Rochester, N. Y.—The Street and Sewer Committee reported in favor of the ordinance for the Bingham street sewer and final ordinance was adopted; estimated cost is $60,000.

Marshall, N. C.—Citizens have voted $20,000 bonds for constructing sewer system and other improvements.

Rugby, N. D.—Citizens are considering the question of sewerage; A. G. Lufkken, Grand Forks, of the Northern Construction and Engineering Company, has addressed them on the subject.

Akron, O.—Council has passed an ordinance for the issue of $2,800 bonds for repairing and improving the Allen street sewer.—D. H. Harter, Clerk.

Akron, O.—Council is considering construction of sewers on Andrus and Worth streets.

Ashtabula, O.—Council has ordered plans for a sewer in Stark street.

Bucyrus, O.—The State Board of Health has ordered city to install a sewage disposal plant by October 1, 1910, and to stop polluting the Sandusky River.

Cincinnati, O.—Council has passed a resolution to construct a sewer in Tafel street and Knorr avenue.

Dayton, O.—Plans are being prepared by City Engineer W. D. Riddle, 1301 U. B. Bldg., for an independent sanitary sewer system in Vernon place, for J. Winters Company; cost, $20,000.

Hamilton, O.—Council will issue $9,500 bonds for the construction of a storm water sewer.

Lebanon, O.—Bids will be called for in about a month for pipe sewers.—A. M. Bower, Engineer.

Oberlin, O.—State Board of Health has approved plans for a sewage purification plant.

Sebring, O.—Citizens will vote on bonds for the construction of a sanitary sewer system and a disposal plant.

Youngstown, O.—County has decided to construct sewers in Earle and McKinley avenues.—M. F. Hyland, Clerk.

Pawnee, Okla.—Engineers Archer & Rollins, Beals Bldg., Kansas City, Mo., have been selected to prepare plans for a system of sewers and water works; cost, $45,000.—John Badger, Chairman Water Committee.

Tulsa, Okla.—City will expend about $60,000 for pipe sewers.—F. C. Hughes, City Engineer.

Brackenbridge, Pa.—Bids will be received for the construction of a 24-inch storm sewer "tile," length, 1060 linear feet, including catch basins, storm drops, manholes and lamphole complete.—G. B. Campbell, Jr., New Kensington, Borough Engineer; W. G. Wolfe, Chairman Street Committee.

Harrisburg, Pa.—Plans are being prepared for the completion of a sewer system and the erection of a sewage disposal plant for the Pennsylvania State Hospital for the Insane.—Dr. H. L. Orth, Superintendent.

Hazleton, Pa.—Bids will be advertised for the construction of sewers in Lincoln, Carson and Mill streets.

Johnstown, Pa.—Council is considering the laying of sewers on McConaughy street, extension of the McMillan street sewer, and the extension of Church street sewer.

New Castle, Pa.—The Sanitary Committee of Councils has decided to look over a site south of Mahoningtown, with a view of erecting a sewage disposal plant some time the latter part of this year or the first part of 1910.

Scranton, Pa.—The Joint Appropriations Committee has granted $400 for extending Fisk street sewer.

West Hazleton, Pa.—Citizens will vote on $15,000 bonds for constructing a sewer system in Green Ridge.—Borough Engineer Moore.

Warren, R. I.—Legislature is considering a bill providing for the construction of a sewer system.

Spartanburg, S. C.—Property owners on Hall and St. John streets have petitioned for sewers; cost, $1,900.

Redfield, S. D.—City has decided to extend sewer system at a cost of $18,000.

Binghampton, Tenn.—The Senate has passed on third reading bill authorizing the issue of bonds for sewer purposes.

Chattanooga, Tenn.—House has passed bill authorizing city to issue $275,000 sewer bonds.

Knoxville, Tenn.—Council has passed an ordinance ordering bids advertised for the construction of the Thompson street sewer.

Memphis, Tenn.—The Senate has passed on third reading bill to authorize city to issue $1,000,000 bonds for the improvement of sewers.

Waterbury, Vt.—City has awarded Lee, Higginson & Co. $25,000 4 per cent sewer bonds at 102.631.

Seattle, Wash.—No award has been made by the Board of Public Works on the sewer contract for Twenty-third avenue, as the lowest bid, $72,306.80, by B. W. Kibler & Co., Tacoma, exceeded the assessment of the district.

Belleville, Ont., Can.—City Engineer Lindsay has presented his report upon the proposed sewerage system; total estimated cost, $50,000.

Brandon, Man., Can.—Council is considering a by-law authorizing the issue of debentures for the construction of a trunk sewer.

Hamilton, Ont., Can.—The Sewer Commission has decided to construct sewers in the annex on Chase, Emily and Clinton streets; cost, $16,000; also a sewer on Hunt street.

New Glasgow, N. S., Can.—Sewer and water works extensions are being considered by Council; cost, $12,000.

Orillia, Ont., Can.—Ratepayers will vote on a by-law to raise funds to provide for a sewerage system in the business section of the town.

Victoria, B. C., Can.—Citizens will soon vote on $50,000 bonds for sewer purposes.

BIDS RECEIVED AND CONTRACTS AWARDED

San Francisco, Cal.—The Board of Public Works, April 14, awarded contract to the Contra Costa Construction Company, of Oakland, for the construction of the Ocean View sewer, at $41,999.

Fred Loeffler submitted the lowest bid for the construction of the Parkside sewer, at $84,000. Marsden Manson is City Engineer.

Washington, D. C.—Bids were opened in the Board room of the District building, April 26, for the construction of about two miles of sewers. The bids were as follows:

Georgetown Trunk Sewer.—For the construction of 3,800 feet of trunk sewer in the valley north of R street, in Georgetown:

R. J. Bell Construction Company—74 cents per cubic yard of excavation, $15 per cubic yard of sewer brick masonry, $1.15 per linear foot of 24-inch diameter sewer pipe, $1.05 per linear foot of 21-inch diameter pipe sewer, 90 cents per linear foot of 18-inch pipe sewer.

James A. Coyle—70 cents per cubic yard of excavation, $16 per cubic yard of sewer brick masonry, $1.25 per linear foot of 24-inch pipe sewer, $1.15 per linear foot of 21-inch pipe sewer, $1 per linear foot of 18-inch sewer.

E. G. Gummell—65 cents per cubic yard of excavation, $15 per cubic yard of sewer brick construction, $1.19 per linear foot of 24-inch sewer, $1.03 per linear foot for 21-inch sewer, 87 cents per linear foot of 18-inch sewer.

Warren F. Brenizer—59 cents per cubic yard of excavation, $13.50 per cubic yard of sewer brick masonry, $1.14 per linear foot for 24-inch pipe, $1 per linear foot of 24-inch pipe, 90 cents per linear foot of 18-inch sewer.

Luzon Avenue Sewer.—For the extension of the Luzon Avenue sewer to Georgia Avenue, of 1,850 feet of 18-inch sewer pipe:

E. G. Gummell—70 cents per cubic yard of excavation, $16 per cubic yard of sewer of 21-inch pipe, 90 cents per linear foot of 18-inch pipe sewer.

Lyons Brothers—85 cents per cubic yard of excavation, $18 per cubic yard of sewer brick masonry, $1.09 per linear foot of pipe.

Warren F. Brenizer Company—65 cents per cubic yard of excavation, $15 per cubic yard of masonry, 91 cents per linear foot of pipe.

Stutler & Ready—79 cents per cubic yard of excavation, $18 per cubic yard of masonry, 90 cents per linear foot of pipe.

James A. Coyle—80 cents per cubic yard of excavation, $20 per cubic yard of masonry, $1.20 per linear foot of pipe.

Fourth Street Relief Sewer—For the construction of a Fourth Street relief sewer, 890 feet of sewer, four feet six inches in diameter:

Lyons Brothers—89 cents per cubic yard of excavation; $17 per cubic yard of sewer brick masonry; $21 per cubic yard of vitrified brick masonry; $8 per cubic yard of concrete masonry.

E. G. Gummell—75 cents per cubic yard of excavation; $14 per cubic yard of sewer brick masonry; $20 per cubic yard of vitrified brick masonry; $7.50 per cubic yard of concrete masonry.

R. J. Bell Construction Company—$1.04 per cubic yard of excavation; $14 per cubic yard of sewer brick masonry; $20 per cubic yard of vitrified brick masonry; $7.75 per cubic yard of concrete masonry.

George Hyman—75 cents per cubic yard of excavation; $14 per cubic yard of sewer brick masonry; $21 per cubic yard of vitrified brick masonry; $6.80 per cubic yard of concrete masonry.

Warren F. Brenizer Company—75 cents per cubic yard of excavation; $13 per cubic yard of sewer brick masonry; $20 per cubic yard of vitrified brick masonry; $7.71 per cubic yard of concrete masonry.

Falls Branch Sewer—For the extension of the Falls Branch sewer, from River road to Wisconsin avenue, 1,600 feet of eighteen-inch sewer:

Warren F. Brenizer Company—70 cents per cubic yard of excavation; $15 per cubic yard of sewer brick masonry; 91 cents per linear foot of pipe.

Lyons Brothers—$1.09 per cubic yard of excavation; $18 per cubic yard of masonry; $1.14 per linear foot of pipe.

R. J. Bell Construction Company—$1 per cubic yard of excavation; $16 per cubic yard of masonry; $1.10 per linear foot of pipe.

James A. Coyle—74 cents per cubic yard of excavation; $18 per cubic yard of masonry; $1.10 per linear foot of pipe.

E. G. Gummell—70 cents per cubic yard of excavation; $16 per cubic yard of masonry, and 93 cents per linear foot of pipe.

Waukegan, Ill.—H. D. Hallet, of Aurora, Consulting Engineer when the city began its era of sewer extensions and associated at one time with the Aurora & DeKalb line, has landed an $84,000 sewer contract in Waukegan. Hallet is now with a contracting firm which makes a specialty of drainage construction; the sewer is known as a ravine sewer.

Abilene, Kan.—P. A. Johnson & Company, of Kansas City, Mo., have secured contract for constructing the West Side sewer for $5,963.

Franklin, Ky.—Contract for constructing 5½ miles pipe sewers has been awarded to Newman Sewer Construction Company, of Evansville, Ind., for $14,791. —C. E. Briggs, City Clerk.

Louisville, Ky.—Charles Stiglitz & Sons will get the sewer cap contract to be awarded by Otto Yost, City Buyer. The bid of the Henry Vogt Machine Company was thrown out because of its informality. This is the contract which the Drummond Manufacturing Company has held since the present administration came into office. The Drummond Company recently sent the city a check for $1,042 for short weights which had crept into their deliveries of the sewer lids by mistake. The Stiglitz firm is the one which raised an inquiry about the old contract and furnished information which brought the Board of Aldermen together in a secret session; the contract it worth about $10,000 a year in gross business.

Houghton, Mich.—H. T. Lewis has been awarded contract, at about $6,000, for constructing a tunnel sewer for the owners of the Park Addition.

Wellington, Mo.—The Engineering Construction Company, Webb City, has contract at $25,000 to construct sewer system and septic tank.

Millburn, N. J.—Michael Garofono, of Summit, was awarded the contract to lay lateral sewers in Elm and Maple Streets and Mountain Avenue, Wyoming, and Constance Road, Short Hills, by the Township Committee, April 26; Garofono had the lowest figures of six bidders, agreeing to do the work for $2,713.50, or $190.85 lower than Neele & Bruno, a Newark firm. Alexander Potter, Engineer of Sewers, was opposed to Garofono getting the job. He favored the contract going to either of the other five concerns. Mr. Potter said he did not see how either of the six firms could attempt to do the work at a figure less than $3,500, and added that even at that price the profits to the contractor would be small. Garofono's bid was: Under 6 feet, 54 cents; 6 to 8 feet, 54 cents; 8 to 10 feet, 54 cents; 10 to 12 feet, 54 cents; 12 to 14 feet, 54 cents; T branches, 60 cents each; manholes, $40 each; flush tanks, $60 each. His bond was fixed at $2,000.

Auburn, N. Y.—H. B. Hooker & Son, of Rochester, were, April 27, awarded the contract by the Common Council for building the sewer for the First, Sixth and Tenth Ward sewer districts, with the proviso that they employ, so far as possible, Auburn citizens as laborers; Hooker & Son were low in the bid at $75,840.64, among the fourteen bidders; the next bidder was about $5,000 higher.

Elmira, N. Y.—LeValley, McLeod & Co. were the lowest bidders on sewer connections, but they were high on water and gas. Under the terms of their bid they declined to accept one part of the work, if they were denied any other part. Therefore they were ineligible for the sewer work on which they were the lowest bidders. For sewer connections on Lake Street between Maxwell Place and Division Street, Robert H. Walker was the next lowest bidder at 40 cents per foot and he was awarded the business. Daniel E. Connors bid 39 cents on the Fifth and Main Street sewers and they were awarded to him. Mr. Connors bid 34 cents on the Park Place connections and won. His bid on Pennsylvania Avenue for connections was 37 cents. This, too, was accepted. All awards were to the lowest bidders.

New Brighton, S. I., N. Y.—The low bidder for the construction of a temporary combined sewer in Richmond Turnpike was James D. Sullivan, of New Brighton, at $4,446.

Saranac Lake, N. Y.—Dowers Brothers, of Ballston Spa, have secured contract for sewers, brick pavement and macadam roads at Saranac Lake for about $142,000.

Oxford, O.—Contract for constructing the proposed sewage disposal plant has been awarded to F. M. Benner & Co., of Marion, Ind., for $15,171.—D. P. Beaton, Village Clerk.

Youngstown, O.—Joseph Hannon has been awarded contract for constructing sections Nos. 1 and 3 of the Poland avenue sewer, at $9,092, and Anthony O'Horo for section No. 2, at $7,937.

Ada, Okla.—H. H. Fitzgerald, of Muskogee, has secured contract for constructing a sewerage system for $32,217.

Guthrie, Okla.—W. F. Power, 206 East Oklahoma avenue, has contract, at $1,164 for Vine street sewer, and at $9,685 for Logan street sewer; work includes furnishing all material and labor, excavating; all back filling.

Allentown, Pa.—The following are the bids opened Apr. 20 for constructing 577 feet reinforced concrete sewer and 120 feet 18-inch vitrified sewers; George W. Meinholz, Reading, $8,938; George H. Hardner, city, $8,326, and Weaver Contracting Co., city, $7,752.

Corry, Pa.—Three bids were received by Council, Apr. 19, for the construction of

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Dover, N. H.—Bids were received April 17 by the Street and Park Commission, Harry J. Wentworth, Engineer, for constructing a sewer in Washington street, alternate bids being taken on brick and concrete construction. The contract was awarded John Cornell, 19 Union street, Dover, to build a concrete and pipe sewer, the concrete to be 6 inches thick and not reinforced. The brick work is to be 8 inches thick. The concrete is to be 6 inches thick of 1-2½-5 mixture, using Atlas Portland cement; the sewer is to be laid on a busy street, surfaced with 10 inches of macadam, containing electric car tracks, and there is an old brick sewer in trench part of district, but near the surface; connections are to be made at end to existing pipe sewer; the excavation is in a hard clay, requiring no sheeting, but some bracing; the city has 28-inch forms for concrete sewer, which may be used by the contractor. Cement costs about $1.65 per barrel; broken stone $1.60 per ton on job, and sand about $1 per cubic yard on job. Labor is plenty at $1.50 to $2 per nine-hour day. Brick cost $10 per 1,000, not delivered. The bids received on the work were as follows: (a) John Cornell, (b) Daniel Chesley, Dover, N. H.; (c) A. O. Coombs, 1 Milk street, Dover; (d) F. H. Cowin Company, 184 Summer street, Boston; (e) E. F. Brigham, Sommersworth, N. H.; (f) Marco Lavorgne & Sons, Bath Harbor, Me., and (g) Pearl Libby, Sommersworth, N. H.

	(a)	(b)	(c)	(d)	(e)	(f)	(g)
3-ft. circular sewer, brick, ave. cut, 12½ ft., 180 lin. ft.	$6.65	$6.13	$7.35	$6.25	$6.70	$....	$9.85
3-ft. circular sewer, concrete, ave. cut, 12½ ft., 180 ft.	5.05	5.31	5.13	4.75	5.13	5.20	7.46
28-in circular sewer, brick, ave. cut, 10½ ft., 200 lin. ft.	4.77	4.35	5.69	5.10	5.36	....	8.14
28-in. circular sewer, concrete, ave cut, 10½ ft., 200 lin. ft.	4.00	3.89	3.78	4.50	4.13	4.90	6.64
18-in. Akron pipe, ave. cut, 7½ ft., 80 lin. ft.	1.65	.74*	2.75	2.00	1.60	1.40	2.94
4x12-ft. circular manhole	37.00	32.00	25.00	45.00	48.00	45.00	40.00
4x9-ft. circular manhole	25.00	32.00	25.00	40.00	40.00	45.00	30.00

*Not including pipe.

the Concord street sewer as follows: Corrigan & Mahoney, $3,405; Joseph McCormick & Bros., $4,514; C. B. McCray & Son, and C. H. Heath, $4,249.

Contracts for constructing sewers were let as follows: Concord street, Corrigan & Mahoney, $3,405.41; Sixth avenue, C. B. McCray & Son and C. H. Heath, $365.60.—C. B. Porter, City Clerk; Nevin R. Dickson, City Engineer.

Erie, Pa.—The Street Committee, April 22, received bids for a number of lateral sewers.

Nine-inch sewer in Liberty street, from Third street south 250 feet, went to Edward Driscoll on 75 cents for 9-inch pipe, 40 cents for 6-inch pipe, $1.20 for Y and T branches, and $40 for manholes.

Two other 9-inch sanitary sewers in Liberty street, from Fifth street north 250 feet, and from Second street south 310 feet, went to McCormick & Bro., their bids being the same on both, 75 cents for 9-inch pipe, 40 cents for 6-inch pipe, $1.25 for Y and T branches and $40 for manholes.

Twelve-inch sewer in Twenty-seventh street, from Parade street east 1,020 feet, awarded to Dwyer & Wolfran on bid of 83 cents for 12-inch pipe, 45 cents for 9-inch pipe, 35-cents for 6-inch pipe, $1.45 for Y or T branches, $41 for manholes and $28 for catchbasins.

Nine-inch sanitary sewer in Cherry and Second streets awarded to Dwyer & Wolfran on bids of 63 cents for 9-inch pipe, 34 cents for 6-inch pipe, $1.10 for Y and T branches and $39 for manholes.

Nine-inch sewer in Plum street, from Third street south 210 feet, went to the same contractors, Dwyer & Wolfran, on practically the same figures, 65 cents for 9-inch pipe, 35 cents for 6-inch pipe, $1.25 for Y and T branches and $40 for manholes.

Dennis O'Brien, Edward Driscoll, Joseph McCormick & Bro., Dwyer & Wolfran and David Jones competed. Thomas H. Mohr tried for the 12-inch sewer on Twenty-seventh street. On some of these bids the difference for the entire sewer was only 60 or 70 cents.

Harrisburg, Pa.—The Central Construction and Supply Company was lowest on three of the five sewer contracts awarded by the City Highway Department. The sewers were authorized last fall and none were very large. The Central bid lowest on the following: Penn Street at $665; Sixteenth at $821 and Agate Street at $516. Lynch & Hessenberger bid low at $190 on Hildrup Street, and Henry Opperman low at $353 on North Street. Work is to be started at once.

Philadelphia, Pa.—Many of the big contracting firms who usually obtain municipal contracts were not in the running, April 27, in the competitive bidding for $250,000 worth of sewer work, with the exception of Edwin H. Vare and David McMahon, who were low bidders. Vare's price for building the Dobson's Run storm-water sewer extension in Ontario Street, from Roberts Avenue to Henry Street, and across private property to south of Juniata Street, was $58,000, and he was awarded contract for the work. Among the 29 bidders who were high on all or some of the work were the Millard Construction Company, William A. Mundy, Daniel S. Bader, David Peoples, Cunningham Paving and Contruction Company, Robert Petriello, M. & J. B. McHugh.

Costello & Co., in which the son of ex-Public Works Director Costello, now in Councils, is the head, bid low at $45,000, and have received contract for main sewer in Magee Street, from Torresdale Avenue to Jackson Street, in Jackson Street, from Magee Street to Unruh Street, and in Unruh Street, from Jackson Street to Algard Street. Lombardi & Passuzzi bid $50,000, the low price, and will construct Frankford intercepting system across private property from the present culvert in Lewis Street to Torresdale Avenue, and in Torresdale Avenue to south of Orthodox Street.

David McMahon was low at $25,000, and has contract for the extension of Gunner's Run main sewer, in Twelfth Street, from Indiana Avenue to Clearfield Street; Lombardi & Perna for $10,000 will build main sewer in Saul Street, from Pratt Street to Akron Street, and in Akron Street, from Dyre Street to Oxford Avenue; Robert Higgins at low bid of $32,000 will build extension of the Wingohocking system in Annsbury Street, from North Penn Railroad to Lawrence Street, and Lombardi & Passuzzi, who were low on the Frankford system, were also successful, at $30,000, for the Wyoming Avenue main sewer, across private property from Frankford Creek to Adams Avenue. The total of the bids is the exact equal of the appropriation.

Smaller contracts were awarded for four sewers in Martha, Penn, Watts streets and Trenton avenue. Lombardi & Pazuzzi obtained two contracts and Lombardi & Perna and Michael McNulty one each. The total of the four was $10,000.

Wilkes-Barre, Pa.—A joint meeting of the Street and Sewer Committees was held last evening at which bids were opened for the various supplies used in their departments. Crushed stone, cement, iron pins, oak stakes, terra cotta pipes, to George M. McAlarney; sidewalks, to Charles McCoy; flagstones, to Frank Anstead; striking hammers, steel for drills, mattocks, to Howell Drill Co.; pine wood desks, to West & Co.; castings, to Gates Foundry Co., and oak stakes to Sturdevant & Sons. The balance of material, consisting of shovels, pails, picks, ropes, brooms, etc., were divided between the White Hardware Co. and Phelps, Lewis & Bennett.

Arlington, Tex.—The J. W. Maxcy Co., of Houston, has been awarded contract for engineering and construction of a sewer system for the city, at $25,000.

Salt Lake City, Utah.—On one little piece of work, known as sewer extension 227, on the west side of Third West, between North Temple and First North, J. D. Hanley got the contract for $1,079.14; the estimated cost was $1,089; Hanley was the only bidder; he bid for 704 cubic yards excavation, $1; 701 feet 8-inch vitrified pipe, 30 cents; manholes, $40, and flush tank, $125.—L. C. Kelsey, City Engineer.

Winchester, Va.—Following are the details of the bid of Irwin Brothers, of Greenville, O., the successful bidder, as stated, Apr. 14, for the sewerage system and intermittent filtration plant for handling raw sewage: 27,850 feet 20 to 8-inch pipe in trench 4 to 6 feet deep, 87 cents to 27 cents per foot; 3,390 feet 20 to 8-inch pipe in 6 to 8-foot trench, 92 cents to 28 cents; 1,340 feet 18 and 8-inch pipe, 8 to 10 feet deep, $1 and 43 cents; 1,230 feet 18 and 8-inch pipe, 10 to 12 feet deep, $1.30 and 53 cents; 830 feet 18 and 8-inch pipe, 12 to 14 feet deep, $1.60 and 73 cents; brick paving, $1.50 and $2 per square yard; manholes, $24; flushtanks, $25, etc.; total for sewers, $23,506, and filtration plant, $7,033.

Totals of other bids received were as follows, sewer system being given first, and then those for disposal plant: Field, Barker & Underwood, Philadelphia, Pa., $36,686, $11,654; Burns Bros., New Castle, Pa., $37,881, $11,254; William H. Opperman, Harrisburg, Pa., $38,714, $8,834; Thomas & Co., Harrisonburg, $35,072, $8,219; H. C. Brooks, Fairmont, W. Va., $37,133, $9,918; McCormick & Co., Philadelphia, Pa., $33,702, $7,850; R. M. Bibb, Roanoke, $32,533, $9,467; I. J. Smith & Co., Richmond, $31,512, $8,791; Abee & Hart, Hickory, N. C., $33,800, $8,311; Norcross & Edmunds, Philadelphia, Pa., $28,854, $8,384; B. R. McClean & Co., Roanoke, $28,613, $7,580; Guild & Co., Chattanooga, Tenn., $27,946, $8,560; So. Pub. Service Co., Richmond, $27,542, $7,734; Cantrell Construction Co., Parkersburg, W. Va., $21,076, $6,764; W. C. Miller, Winchester, $8,352.—N. Wilson Davis, of Harrisonburg, Engineer.

Tacoma, Wash.—Frank Race has secured contract for laying sewers in District 188 on North Forty-second, Forty-third and other streets, for $548.75.

Racine, Wis.—P. B. Johnson has contract for a sewer in Tenth street, at following bid: 24-inch pipe, $2.28; 21-inch, $2.40; 18-inch, $2.20; 12-inch, $1.45, and manhole, $20; Andrew Thompson, for sewer in North Main street: 10-inch pipe, $1.10; manhole, $4; catch-basin, $40. Sewer for Marquette street, 24-inch pipe, $2.95; manhole, $25.

MacLeod, Alta., Can.—The contract for the supply of sewer pipe to the town has been awarded to the Ontario Sewer Pipe Co., Limited.

Montreal, Que., Can.—Messrs. Henault & Hefferman were awarded the contract for a system of sewers for the municipality of St. Pierre; the work will consist of 16,000 feet of drain sewers, exclusive of manholes and specials and will cost about $100,000; the other tenderers for the work were W. G. A. McDonald and Bray & Bastien.

Peterboro, Ont., Can.—Sewer pipes for 1909 will be purchased from the Ontario Sewer Pipe Co., of Mimico, Ont., at a couple of cents per foot less than was paid last year; this tender was 6 cents per foot f.o.b. Mimico; the Hamilton Sewer Pipe Co. tendered 6 9-10 cents per foot f.o.b. Hamilton.

WATER SUPPLY

Clarendon, Ark.—Bids will be received for drilling an 8-inch artesian well.—C. H. Jenks, Fayette, Miss., Consulting Engineer.

San Francisco, Cal.—The Committee on Public Utilities of the Supervisors has decided to recommend that $240,000 bonds be sold to defray cost of preliminary work at Lake Eleanor.

San Luis Obispo, Cal.—Citizens have voted to issue $80,000 bonds for improvements and extensions to the municipal water works.—E. W. Clark can be addressed.

Watsonville, Cal.—Town is considering purchase of water system; Engineer Duryea, Palo Alto, Consulting Engineer.—C. B. Lewis, City Engineer.

Ft. Logan, Col.—The water works system will be improved at a cost of about $30,000.

New Britain, Conn.—The Board of Public Works is considering the laying of two or three more filter beds in order to eliminate water which accumulates at the Berlin filter beds.

Wilmington, Del.—City has awarded the Equitable Guarantee and Trust Company, city, the $100,000 city water bond issue for $101,110.

Washington, D. C.—The Bureau of Insular Affairs of the War Department will receive bids May 10 for $1,000,000 water and sewer bonds of the city of Manila.

Jacksonville, Fla.—The Committee on Laws and Rules has favorably recommended for addition ordinance providing plans for the extension of high-pressure water mains through certain streets and the construction of a pumping station at Newriver street.

Ellijay, Ga.—Citizens will vote on bonds for water works and electric light plant.

La Fayette, Ga.—Citizens are considering installation of water works.

Voilmer, Ida.—The Board of Village Trustees will begin work soon on the new water system; about two miles of main pipe will be laid through the streets and fire hydrants installed; $10,000 will be expended.

Beecher, Ill.—The Business Men's Association is discussing the proposition of establishing a water works system.

Chicago, Ill.—Plans have been approved for rebuilding the intermediate lake crib destroyed by fire.

Galesburg, Ill.—Mayor Geo. Sanderson has recommended a better and more adequate water supply.

Lewisville, Ind.—Bids will be received in May for the construction of water works; cost, about $8,000.—O. J. Richardson, City Clerk.

Edgewood, Ia.—Citizens will vote on May 17 on $7,000 bonds for water works purposes.—E. B. Shaffer, Clerk Council.

Leon, Ia.—Town is considering need of water works system.

Mason City, Ia.—Council has ordered 1,545 feet of 4 and 6-inch mains laid.

Osage City, Kan.—Citizens will vote on bonds for the installation of a water works system.

St. John, Kan.—Burns & McDonnell, Scarritt Bldg., Kansas City, Mo., have prepared plans for a municipal water works.

Bowling Green, Ky.—Council has received the report of Granbery Jackson, a Consulting Engineer, concerning the proposed filtration plant for the city; Council ordered Mr. Jackson to prepare a specification for the filter according to recommendations

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West Allis, Wis.—The bids of J. H. McCarthy, Chicago, Ill. (A), have been accepted for furnishing material and constructing brick and pipe sewers, at $41,129.50, and for constructing two disposal plants, at $24,000. Other bids received for the disposal plants were: C. J. Foster Co., city, $24,600; F. G. Mortimer, Chicago, Ill., $31,000, and Daniel B. Danielson, Milwaukee, $23,969. Totals for constructing sewers follows: (B) R. J. Hickey, Milwaukee, $44,376.80; (C) George E. Zimmerman, Milwaukee, $42,657.30; (D) Herman Hohensee, Milwaukee, $43,525.38; (E) Robert Nelson, Racine, $44,135.12. F. H. Nakielski, Milwaukee, $44,980; Thora Szukalski, Milwaukee, $47,957.01; Daniel West Construction Co., Milwaukee, $39,950; P. J. Ryan, St. Paul, Minn., $48,473.10.

			Successful Bid A		B	C	D	E
			per Ft.	Totals				
5,036 lin. ft.	30″	brick sewer.	$3.20	$16,115.20	$19,590.04	$17,122.40	$18,419.41	$22,662.00
1,619	24″	pipe	1.50	2,428.50	4,015.12	4,857.00	3,658.94	3,642.75
2,401	22″		1.40	3,361.40	5,906.46	7,683.20	6,613.84	5,762.40
2,044	20″		1.20	2,452.80	4,374.16	4,701.20	4,241.28	4,394.60
4,623	18″		1.10	5,085.30	8,228.94	6,472.20	8,672.41	5,778.75
663	15″		1.00	663.00	1,087.32	861.90	762.45	822.12
537	12″		.90	483.30	794.76	644.40	617.55	483.30
380	10″		.80	304.00	380.00	315.00	425.50	319.20
				Fittings 10.236			*Covers* 114.00	*Manholes* 270.00

contained in the report; plant will cost about $18,000.

Louisville, Ky.—The Board of Water Works will soon advertise for proposals for the construction of a 12,000,000-gallon basin to be constructed west of the Crescent Hill reservoir and north of the Louisville and Nashville railroad tracks; it will take about a year to do the work and the cost will be approximately $100,000; basin will be known as a coagulant tank, where the water will be allowed to subside until most of the mud and other foreign matter settles to the bottom.—Chief Engineer Theodore A. Leisen.

Newport, Ky.—The Superintendent of Water Works has been authorized to prepare plans and specifications for a standpipe on Clifton Heights and engine, mains and other improvements; $85,000 bonds will be issued.

Paducah, Ky.—Fire Chief Wood has recommended the laying of mains on Kentucky avenue.

Baltimore, Md.—The company controlling territory at Severna Park will install a water plant; water supply will be furnished from large springs on the property; plans have been completed and bids will be asked very soon.

Oakland, Md.—City will purchase 50-hp. boiler for water works.

Belmont, Mass.—City has awarded $10,000 water bonds to G. A. Fernald & Co., at $112.66.

Concord, Mass.—City has awarded $65,000 water bonds to Adams & Co., at $103,041.

Dudley, Mass.—Citizens have voted in favor of water works.—Eben S. Stevens, Chairman Water Committee.

Marblehead, Mass.—Work will be begun in the near future on a $15,000 filter plant for the Water Department at Leggs' Hill.

Shelburne Falls, Mass.—Town has decided to build four standpipes.

Detroit, Mich.—The Water Board has adopted the specifications of Smith, Hinchman & Grylls, Washington Arcade, for the proposed new pumping station; cost, about $800,000.

East Grand Forks, Minn.—Loweth & Wolff, Engineers, St. Paul, have been selected to prepare plans for the extension of the water works system.

Hawley, Minn.—Citizens have voted to install a water works system.

Kansas City, Mo.—City will ask bids for powerful pumps for better water pressure in vicinity of Elmwood avenue.

St. Edward, Neb.—City has selected Chas. F. Sturtevant, Holdredge, to prepare plans for water works; $20,000 is available.—W. F. Flory, Village Clerk.

Bayonne, N. J.—Council has passed an ordinance for the laying of water pipes in Eighteenth and Twenty-sixth streets.—W. C. Hamilton, City Clerk.

Jersey City, N. J.—E. H. Harriman has offered to turn over to the State 23,000 acres of land in the northern end of the State, near the New York boundary line, in Passaic County, provided the State will acquire the rest of the land that may be needed for the proposed reservoir to supply various municipalities in northern New Jersey, who are now dependent on private water companies for their supply.

New Brunswick, N. J.—Governor Fort has signed a bill giving New Brunswick the right to issue bonds for the construction of a filtration plant.

Trenton, N. J.—The State Water Supply Committee has requested the Hudson County Water Company to file with it plans of the proposed works and distributing system for the diversion of water from this State to Staten Island, in order that they may be inspected by the Commission's Engineer.

Deming, N. M.—The Luna County Farmers' Association is discussing the matter of endeavoring to induce the government establish a pumping plant in this city.

Buffalo, N. Y.—Council has adopted the report of the Special Water Commission providing for a system of water mains, to be completed in five years; $400,000 is available.

Machias, N. Y.—The Machias Water Supply Company has been incorporated with George N. Cowan, Delevan, N. Y., as President; water will be supplied from springs about three miles from the village.

Newburgh, N. Y.—The Aqueduct Commissioners of New York City have begun the preliminary work on their projected reservoir at Patterson and Pawling, in Putnam and Dutchess counties; it will involve an expenditure of not less than $3,250,000 and the removal to another site of twelve miles of the tracks of the Harlem Division of the New York Central Railroad; following this project the Commissioners are planning to build another reservoir at the Beaver Dam Brook site, near the village of Katonah, adjoining the Cross River reservoir, at a cost of at least $3,700,000.

Niagara Falls, N. Y.—City will soon be in the market for about 4,000 tons of 16, 24, 30 and 36-inch water pipes.

Rochester, N. Y.—City Engineer Fisher has recommended extension and enlargement of a number of water mains at an estimated cost of $125,000; this is for improved fire protection.

Marshall, N. C.—Citizens have voted $20,000 bonds for completing water works, constructing sewer system and improving streets.

Monroe, N. C.—Citizens will vote May 29 on $18,000 bonds for construction of new water works system and changing deep-well pumps from steam drive to electric.—H. B. Adams, Secretary Board of Aldermen.

Grand Forks, N. D.—Mayor J. D. Taylor has recommended a filtration system; R. E. Wickham, Assistant City Engineer, has investigated methods and recommended system recently installed in Lindsay, Ont.

Bucyrus, O.—The Board of Public Service will advertise for bids for the supplying of water for fire purposes, streets, squares and other public places.—Aug. Broemel, Clerk Council.

Dayton, O.—The Board of Service has recommended the purchase of the Dayton Hydraulic Company's plant and the laying of a water main from the reservoir to the Keowee street pumping station; to obtain this wells will have to be sunk and three centrifugal pumps of 6,000,000 gallons capacity installed; cost, exclusive of purchase of land, $225,000.

Dayton, O.—Superintendent of Construction Heffernan of the Water Works has asked Servers to advertise for bids for regular yearly supply of material, including 1,000 5-8-inch meter; 50 ¾-inch and 25 meters of one inch or more capacity.

Dayton, O.—Superintendent of Construction Heffernan of the Water Works has submitted estimates of cost of construction of water pipes on the following streets to the Servers, and the work has been authorized by the Board: Pritz, $570; Gunckel, $265; Brandt, $1,500; Pleasant, $395; Union, $1,090; Perry, $450, and changing mains on Linden, $210.

Eaton, O.—Mayor Miller has recommended that the Board of Public Affairs reduce proposed bond issue to $2,500 for improvements to water system.

Jamestown, O.—Citizens will vote on installation of a municipal water works.

Toledo, O.—Council Committee on Ways and Means has appropriated $500 to send a committee of six to New York, Philadelphia and Cleveland to investigate power and stations for the operation of the proposed high-pressure water mains; committee will consist of members of the Service Board, the Superintendent of the Water Works, a member of the Safety Board, the Fire Chief and Messrs. Staunton and Webster of Council.

Carmen, Okla.—The O'Neil Engineering Company, Dallas, Tex., has been selected to prepare plans for a system of water works; cost, $30,000.

Pawnee, Okla.—Plans are being prepared by Engineers Archer & Rollins, Kansas City, Mo., for a system of water works.

Tulsa, Okla.—Citizens have voted to improve water works, sewer system and parks and erect a fire station and storage building.—E. B. Cline, City Auditor.

Weatherford, Okla.—City will issue $10,000 bonds for fire protection, including the building of a storage reservoir and fire station, installation of pump, fire hose and fire wagon.—Wm. Mackintosh, Oklahoma City, Okla., Engineer in Charge.

Portland, Ore.—Fire Chief Campbell is urging the laying of reinforcing mains throughout the business section of the west side.

Portland, Ore.—Mayor Lane has won fight with Water Board for the rejection of all water main bids; Board has rescinded action on all except those on which property owners would waive all objections.

Salem, Ore.—W. J. Culver, city, has been selected as Engineer for the proposed mountain water system.

Catasauqua, Pa.—The National Bank of this city has purchased the $80,000 bond issue for the new municipal water plant, paying a premium of $1,642.

Pittsburg, Pa.—Council has accepted ordinance for the issue of $200,000 bonds for the installation of machinery at the Huron Hill pumping station.

Saegerstown, Pa.—The Water Board, Pitt S. Davis, Chairman, has instructed the Secretary to correspond with several consulting engineers with regard to the probable cost of a complete system of water works for the town.

Newport, R. I.—Commander Fullam of the Naval Training Station has asked the Navy Department for $3,000 for sanitary drinking water system.

Chester, S. C.—Citizens will vote May 4 on $26,000 water works and street improvement bonds.

Faulkton, S. D.—Citizens have voted $15,000 bonds for water works.

Iroquois, S. D.—Citizens have voted $3,000 bonds for the improvement of the municipal system of water works.

Chattanooga, Tenn.—The Board of Aldermen passed resolution authorizing the sale of $900,000 water works bonds; bids will be received for construction of proposed water works system.

Dallas, Tex.—Bids will be opened May 5 for a carload of stop boxes for the Water Department.

Grandview, Tex.—Citizens have voted $5,000 bonds for extension of water mains.

Rusk, Tex.—Town will install a water works system.

Norfolk, Va.—The National Board of Fire Underwriters has recommended that complete plans showing detail locations of mains, gates, hydrants, and of all private fire service equipment, be kept and properly indexed and filed; also that the two 5,000,000-gallon pumps be installed at the pumping station and the present roof replaced by one of incombustible material.

Asotin, Wash.—City has granted the Anatone Water Company a 25-year franchise to construct and operate a water system.

Malden, Wash.—Work will shortly begin on proposed water system; plant will consist of an open well and a gasoline plant.

Oroville, Wash.—The Water Company has decided to build a 250,000-gallon reservoir.—J. F. Samson, President.

Sunnyside, Wash.—Citizens will soon vote on bonds for municipal water works.—H. M. Tinker, Engineer.

Tacoma, Wash.—Superintendent Whitney has prepared plans for laying water mains through the entire Indian addition, calling for an expenditure of $36,000.

Walla Walla, Wash.—The Water Committee has recommended that a water main be laid on Olive street.

Wilbur, Wash.—Citizens will vote on bonds for installation of iron water mains.

Keyser, W. Va.—City is considering the increase of the water works supply; Leander Schaidt, Cumberland, Md., has been selected to prepare estimates for piping water from New Creek and to construct second dam; cost, $15,000.

Parkersburg, W. Va.—Citizens have voted $270,000 bonds for the construction of a new water works system.

Johnson Creek, Wis.—This village has voted $14,000 in bonds for the construction of a water works system; no engineer to supervise the construction has yet been employed.

Ft. Frances, Ont., Can.—City will extend water works system.

Lethbridge, Alta., Can.—City is calling for tenders for a steam pumping equipment to deliver 3,000,000 gallons per 24 hours.

Owen Sound, Ont., Can.—Citizens will vote May 15 on four by-laws as follows: Water works extension and filtration plant, $125,000; electric light debt and extension, $30,000; Town Hall improvements, $7,000; isolation hospital, $3,500.

Peterborough, Ont., Can. — Engineer Kennedy is preparing plans for new water works dam for the Water Commissioners.

Toronto, Ont., Can.—The City Engineer has recommended the construction of water mains on the following streets: Dunvegan road, Shaw street, Castle Frank crescent, Duggan avenue, Gormally avenue, Roxborough street east, Russell Hill road and Constance street.

Toronto, Ont., Can.—Plans and specifications for the city water filtration plant have been completed; tenders will be advertised for very soon.

BIDS RECEIVED AND CONTRACTS AWARDED

Fowler, Col.—Doyle & Schwartz, of Colorado Springs, have been awarded contract to install a system of municipal water works here, at about $7,400.

South Bend, Ind.—For the second time the Board of Public Works, April 27, received bids for the construction of a concrete reservoir at the north pumping station and took the bids under advisement. The bids received were from Harry N. Barnes, South Bend, $17,600; E. E. Burner & Co., South Bend, $16,890, and Nolf & Fellows, Kalamazoo, Mich., $17,276.45.

Bids rejected two weeks previous were as follows: Harry N. Barnes, South Bend, $14,390; Hoban & Roach, South Bend, $26,405; E. E. Burner & Co., South Bend, $19,200; Union Engineering and Construction Company, Chicago, $19,000, and Nolf & Fellows, Kalamazoo, Mich., $20,000. Contractor Barnes at that time withdrew his bid on account of errors.

McPherson, Kan.—The successful bidder for furnishing C. I. pipe was the U. S. Cast Iron Pipe and Foundry Co., of Chicago, who made a price of $29.90 for 6-in. pipe and $30.90 for 4-in. pipe f.o.b. McPherson, this and other bids being for 22 pounds 4-in. pipe and 33 pounds 6-in. pipe. The Dimmick Pipe Co., of Birmingham, Ala., made a price of $33.85 per ton for 4-in. pipe and $32.85 per ton for 6-in pipe

f.o.b. McPherson. The American Cast Iron Pipe Co. of Kansas City, Mo., made a price of $31.45 per ton for 6-in. pipe and $32.45 per ton for 4-in pipe f.o.b. McPherson. The U. S. Water & Steam Supply Co., of Kansas City, Mo., made a price of $33.50 per ton for 6-in. pipe and $34.50 per ton for 4-in. pipe f.o.b. McPherson.

The terms for laying pipe are as follows: For hauling and laying 4-in. cast iron pipe, 14 cents per ft.; for hauling and laying 6-in. cast iron pipe, 14 1-2 cents per ft.; for hauling and setting hydrants, $5 each; for hauling and setting 4-in. and 6-in. gate valves, $1 each.—A. J. Shaw, Cashier.

Winona Cliffs, Md.—The Winona Cliffs Company, 940 Equitable Bldg., Baltimore, Md., has awarded contract to Morton McI. Dukehart, manager Buckeye Engine Co., 413 Continental Bldg., Baltimore, for construction of water and filtration plant; filtration plant is to have capacity of between 100,000 and 200,000 gallons of water daily.

Holyoke, Mass.—The Water Board, Apr. 26, opened bids for supplies of pipe, special castings, gates and lead. Eight bids were received for furnishing 6, 8, 10, 12 and 16-inch pipe, and the contract was awarded to Charles Miller & Sons Co., at a price of $23.40 per ton; this firm also won the contract for furnishing the special castings at 2.5 cents per pound.

Six firms submitted bids for furnishing lead. The contract was awarded to C. S. Merrick Company at $4.55 per 100 pounds.

The four bids for furnishing valves and fittings were opened, but no award was announced.

The bidders and their bids, as opened by the Board, for furnishing the pipe, etc., were as follows:

Pipe.—All the bids for furnishing pipe were made on 6, 8, 10, 12 and 16-inch sizes. Warren Foundry and Machine Co., pipe, $24.75 per ton; special castings, 2.4 cents per pound. R. D. Wood & Co.: Pipe, $24.45 per ton; special castings, $50 per ton. Chas. Miller & Sons: Pipe, $23.40 per ton; special castings, 2.4 cents per pound. John Fox & Co.: Pipe, $23.70 per ton; special castings, 2.4 cents per pound. U. S. Cast Iron Pipe and Foundry Co.: Pipe, $23.80 per ton; special castings, 2.5 cents per pound. M. J. Drummond & Co.: Pipe, $24 per ton; special castings, 2.5 cents per pound. Holyoke Valve & Hydrant Co.: Pipe, $24.80 per ton; special castings, 2.5 cents per pound.

Fittings.—All bids were for furnishing valves in 6, 8, 10 and 12-inch sizes. Ludlow Valve & Hydrant Co., $12, $25, $18.45, $26.35 and $33.25. Rensellaer Mfg. Co.: Standard valves, $9.50, $15, $21 and $26; special, $11, $17, $23.50 and $30. Pratt & Cady: Standard, $10.50, $15.75, $21, $26; special bronze, $11.75, $16.50, $22.50, $32. Chapman Valve Mfg. Co.: Standard, $9.20, $14.80, $21.60, $29.20; special, $11.60, $17.20, $26, $34.80.

Lead.—J. Russell & Co., $4.75 per 700 pounds; Chadwick Lead Co., of Boston, $4.63 per 100 pounds; Herrick Co., Boston, $4.50 per 100 pounds; C. S. Marsick Co., $4.55, ½ per cent off for cash; U. S. Lead Co., New York, $4.70 per 100 pounds; Richards & Co., Boston, $4.63 per 100 pounds.

Houghton, Mich.—The contract for constructing 3,000 feet of water system on the Dakota Heights property in West Houghton has been awarded to J. J. Byers.

Carthage, Mo.—A resolution has been adopted awarding the contract of erecting a concrete water fountain in South James street to J. O. Leach.

Special committee has purchased a team of horses for the village for $600 from Alvin Bullard, of Philadalphia; the team will be used to work on the streets and to draw the fire engine.

Carthage, Mo.—The Board of Public Works has let the contract for the immediate drilling of a deep well in Carthage as a test of the deep-water supply; if the test well proves satisfactory both as to quantity and quality, a number of other similar wells will be drilled, sufficient to furnish the desired supply of water for the proposed municipal water works system in Carthage. P. D. Crossman, of Joplin, who has had much experience in drilling deep wells, was the successful bidder. The hole will be 11 inches in diameter to the foot of casing, and the casing is to be 8 1-4 inches in diameter on the inside. Below the foot of the casing the diameter of the drilled hole will be the same as the inside of the casing. The contract provides that there shall be at least 250 feet of casing, and the members of the Board seem to think that it will be well to supply casing to a depth of 400 or 500 feet, in order to be sure and shut off all surface veins of water. Mr. Crossman's contract price is $1.35 per foot to the bottom of the casing, whatever depth that may be. After that the price will be $1.24 per foot until 1,000 feet of depth is reached. From 1,000 feet to 1,100 feet, the price will be $1.60 per foot, with an increase of $10 per 100 feet for each additional 100 feet of depth after that. It is optional with the city as to the depth of the well after a depth of 800 feet is reached, and the driller is bound to continue the drilling to a depth of 1,600 feet if the city demands it. It is thought that a depth of 1,000 feet at the most will be sufficient for the well, and if so, and providing 450 feet of casing is used, the cost of the hole would be $1,290, exclusive of the casing. The contractor is to furnish everything in filling this contract, save that the city is to supply the casing. It is estimated that the casing will cost slightly less than $1 a foot laid down in Carthage.

The other bidders beside Crossman were Bailey & Waugh, Pittsburg, Kan.; Ballard & Jones, Joplin; Chas. Richardson, Joplin; Wigginton & Milton, Webb City.

Woodbine, N. J.—M. L. Bayard & Co. has the contract for the erection of a 50,000-gallon tank for the water plant.

Elmira, N. Y.—Edgar E. Krowl was low bidder on water connections, his figure being 58 cents per linear foot. He was awarded the business; he also won on the artificial gas connection bid at 28 cents per linear foot.

Rome, N. Y.—The Water and Sewer Board, Apr. 24, let the contract for laying iron pipe from Stokes's reservoir to Rome to Thomas Bove, the lump amount of his bid being $24,715.75. The contract for valves and valve boxes was awarded to the Ludlow Valve Manufacturing Company, of Troy, for $899.85.

Dayton, O.—But four foundries responded to the advertisement by the Service Board for bids on furnishing 575 tons of cast-iron pipe to the Water Department. The United States Cast Iron Pipe & Foundry Coc-pany, of Chicago, which secured the last contract from this city, was again low bidder, at $15,152.50, and secured contract; bid was about $376 lower than the others. The Glamorgan Pipe & Foundry Company, of Lynchburg, Va., was next. The Central Foundry Company, New York City, and the Massillon Iron and Steel Company also submitted bids.

The Central Foundry Co., through its representatives, made a strong fight to get their material in the city, showing the Board that, with the specials and everything else included, their material would still be $475.34 lower than the United

New Haven, Conn.—Contract prices for constructing Wepawaug Tunnel, consisting of 8,400 feet of 6½-foot rock tunnel, received by New Haven Water Company, office of A. B. Hill, Consulting Engineer, New Haven, for which the Gore-Meenan Co., of New York, was awarded contract.

BIDDER	Unlined Tunnel 8,400 Lin. Ft.	Tunnel Lining 500 Lin. Ft.	Portland Cement 500 Bbls.	Total Estimate
	P. F. L.	*P. F. L.*	*P. Bl.*	
MacArthur Brothers Co., 11 Pine St., New York City	$24.00	$12.00	$1.75	$208,475.00
The Blackstaff Engineering Co., 1332 Walnut St., Phila, Pa.	21.75	12.50	2.00	189,950.00
The Rosser Eng. & Contr. Co., Kingston, Pa	19.55	15.00	2.00	172,300.00
The Geo. M. Byrne Co., 79 Milk St., Boston, Mass	19.50	10.00	2.00	169,800.00
The Ryan, Unmack Co., 134 Olive St., New Haven, Conn.	18.00	17.00	2.00	160,700.00
The N. Y. Con. & Jewell Fil. Co., 15 Broad St., N. Y. City	18.00	16.00	2.00	160,200.00
Bunting, Bull Co., 1 Madison Ave., New York City	18.00	15.00	2.50	159,950.00
The Allboro Contracting Co., 26 Cortlandt St., N. Y. City	17.85	15.00	1.65	158,265.00
C. W. Blakeslee & Sons, New Haven, Conn	17.75	12.50	2.00	156,350.00
Joseph McCabe, 505 Banigan Bldg., Providence, R. I	15.90	18.50	1.90	143,760.00
P. F. Brendlinger, 1009 Arcade Bldg., Philadelphia, Pa	16.00	8.00	2.00	139,400.00
Kelly & Long, 15 Intervale Rdrk., Dorchester, Mass	16.00	8.00	1.50	139,150.00
Metropolitan Contracting Co., 95 Milk St., Boston, Mass	15.85	9.50	1.65	138,715.00
Chas. E. Fraser & Co., 315 Fifth Ave., New York City	15.98	6.00	1.95	138,207.00
The Drave Contracting Co., Pittsburg, Pa	15.75	7.00	2.25	136,925.00
Joseph Hanreddy, 79 Dearborn St., Chicago, Ill	15.00	6.00	1.85	129,925.00
The United Eng. & Con. Co., 17 West 42d St., N. Y. City	14.93	5.00	2.00	128,912.00
Geo. Sargent, Jr., 32 Broadway, New York City	13.74	6.00	1.65	119,241.00
Gore-Meenan Co., 206 Broadway, New York City	10.50	15.00	1.50	96,450.00

Ogden, Utah.—Abstract of proposals received, April 19, for distributing reservoir for Water Works Department. Bidders (A) Wheelwright Construction Co., Ogden, Utah; (B) W. J. Moran, Ogden; (C) J. P. O'Neill Construction Co., Ogden.—City Engineering Department, Ogden, Utah, April, 1909:

ITEMS	Estimated Quantities	Unit Price (A)	Amount (A)	Unit Price (B)	Amount (B)	Unit Price (C)	Amount (C)
Excavation measured in cut. per cu. yd	26,000	$0.36	$9,360.00	$0.37	$9,620.00	$0.35	$9,100.00
Concrete in place, including forms, etc., per cu. yd	142	9.40	1,334.80	11.50	1,633.00	9.50	1,349.00
24" wood stave pipe in place, per lin. ft	685	1.54	1,054.90	1.90	1,301.50	2.50	1,712.50
20" wood stave pipe in place, per lin. ft	775	1.42	1,100.50	1.80	1,395.00	2.50	1,937.50
12" tile pipe in place, per lin. ft	200	.53½	106.50	.81	162.00	1.00	200.00
8" tile pipe in place, per lin. ft	100	.33	33.00	.65	65.00	.70	70.00
Lumber for lining, flash boards, etc., per 1,000 ft. B. M	23	34.00	782.00	37.00	851.00	37.00	851.00
Time		120 days		150 days		60 days	
Totals			$13,771.70		$15,027.50		$15,220.00

Salt Lake City, Utah.—Doyle Brothers & Schwartz, a firm which has not before handled city contracts, was, April 24, awarded the laying of the water mains during the next year, its bid of $155,190.96 being the lowest of six competitors; this will mean 22 miles of mains, but much more work may be added if further water main extensions are ordered by Council.—L. C. Kelsey, City Engineer.

WORK AND MATERIAL	Quantities	Awarded to Doyle Bros. & Schwartz	P. J. Moran	James Kennedy Cons. Co.	J. D. Hanley	Davis & Heuser Cons. Co.	V. P. Strange*
		Price	*Price*	*Price*	*Price*	*Price*	*Price*
Exc. cu. yds	36,000	$0.46	$0.55	$0.54	$0.54	$0.56	$0.50
C. I. pipe, 4" lin.ft.	100	.80	.58	.61	.70	.65	.88
" " 6" "	90,000	.90	.88	.91	.99	.96	.99
" " 8" "	6,000	1.30	1.22	1.20	1.20	1.33	1.39
" " 10" "	6,200	1.84	1.78	1.83	1.50	1.97	2.02
" " 12" "	8,700	2.25	2.28	2.36	1.90	2.54	2.58
" " 16" "	144	3.84	3.60	3.90	4.00	4.00	4.40
Special Castings	63,000	.045	.045	.0475	.05	.04	.05
Valves, 6" each	270	15.75	15.00	16.25	22.00	20.50	18.50
" 8" "	15	24.00	21.00	21.25	30.00	30.00	27.50
" 10" "	15	37.00	31.00	30.50	40.00	44.00	39.00
" 12" "	20	47.00	40.00	41.50	60.00	56.00	48.00
Hydrants, each	140	46.00	45.00	44.50	60.00	54.00	47.00
Cast Iron Valve Boxes, each	270	4.75	4.00	4.60	8.00	7.00	6.25
Br'k V've B'x. "	30	28.00	28.00	27.00	30.00	30.00	34.00
Br'k Hyd. B'x. "	20	33.00	45.00	43.00	35.00	42.00	40.00
Cem. Pl'st'r,sq.yd.	50	1.00	.30	.35	1.00	50.00	50.00
Total		$155,190.96	$155,368.40	$159,186.35	$165,766.00	$170,993.00	$171,366.60

*Strange also submitted alternate bid on Valves and Hydrants as follows: 6-in. Rensselaer Valves $17.50; 8-in., $26.50; 10-in., $37.00; 12-in., $46.00; and on Mathews Hydrants, $45.50 each.

States Co.'s bid, after the pipe is laid. The Service Board was not willing to make such a radical change and take the risk with new pipe, but agreed to place a trial order with the company to the extent of $490.

Wentworth, S. D.—Contract for constructing water works has been awarded to J. L. White, of Sioux Falls, for $7,000.—Charles Power, Town Clerk.

Crockett, Tex.—The J. W. Maxcy Co., of Houston, has been awarded contract for engineering and construction of a water works system at $35,000.

Elgin, Tex.—City has awarded contract to the J. W. Maxcy Co. for engineering and construction of a water works system at $30,000.—J. C. Miller, Chairman Water Works Committee.

Mart, Tex.—Council opened sealed bids, April 23, for the construction of the dam for City Lake, and the contract was awarded to F. W. McMillen, of Dallas, his being the lowest bid.

Sturgeon Bay, Wis.—L. P. Nebel has secured the contract for laying a 1½-inch water pipe from the new light plant to the school house to supply the building with drinking water.

St. Boniface, Man., Can.—Council has awarded contract to the National Meter Co., to supply the city water meters, at $13.26 each.

St. Francis, Ont., Can.—The Town Council has awarded contracts as follows for water and sewer extensions: For labor, Holmes & Kinnemond, Portage la Prairie; hydrants, valves, etc., Canada Foundry Co.; sewer pipe, Dominion Sewer Pipe Co.; manhole covers and traps, castings for sewers, R. McDougall Co., Ltd., Montreal; cast-iron pipes for water and mains and special casting, Canada Iron Corporation Co., Fort William; total cost, $25,706.

LIGHTING AND POWER

Dothan, Ala.—Citizens will vote May 10 on $20,000 electric light and sewer extension bonds.

Fort Bragg, Cal.—The Fort Bragg Electric Light Company will enlarge its electric light plant and install a 750-kw. generator and steam turbine during the summer; another transmission line will be erected from this city to Mendocino to improve the service.—F. C. White, city, Manager.

Glendale, Cal.—Council has passed resolutions to expend $60,000 in purchasing a site and constructing a municipal electric light and power plant.

Placerville, Cal.—City will on June 1 cease to take electricity from the American River Electric Company for lighting purposes.

San Bernardino, Cal.—The Lytle Creek Power Company has decided to increase its capacity by one-half and to extend its system throughout the residence section of the city; to cover the cost of the big work it has been decided to vote a bond issue of $300,000.

Denver, Col.—The Northern Colorado Power Company has decided to make extensions to its distributing system in the Longmont-Greeley district for the purpose of furnishing electricity to farmers in that district for pumping; cost, $150,000.—W. J. Barker, 405 Seventeenth street, Denver, President.

Rifle, Col.—The Rifle Light, Heat and Power Company will receive bids about June 1 for construction of a hydro-electric plant from plans of O'Brian & Tomlinson, Nassau Bldg., Denver; cost, $45,000.—W. J. Le Rossignol, city, Secretary

Rifle, Col.—Bids will be received May 17 for $35,000 bonds of the Rifle, Light, Heat and Power Company.—W. J. Le Rossegnol, Secretary.

Washington, D. C.—Vice-Consul-General Ross J. Hazeltine, of Halifax, has forwarded a clipping from the Halifax "Herald," which states that an act to incorporate the Nova Scotia Power and Pulp Company is before the Legislature. The object and powers of the company, among other things, will be to generate and manufacture electric or galvanic currents, and all material and appliances or apparatus, conversion and use of the same, and to use or sell and dispose thereof for heating, lighting and for power for any domestic or industrial purpose, including the operating of mills and manufactories of all sorts; also to carry on a general lumbering business, manufacture wood into any form of commodity, including wood pulp, manufacture paper from wood pulp or other material, and to sell and dispose of said lumber, commodities, pulp and paper.—Address No. 3346, Bureau of Manufactures.

Ellijay, Ga.—City is considering an election on bonds for electric light plant and water works.

Mountaintown, Ga.—The Coosawattee & Mountaintown Rivers Power and Improvement Company has been formed by Wm. M. Scott and E. W. Watkins, Sr., to develop water power in Gilmer County and furnish electric current to neighboring towns; privilege has been asked to increase capital stock from $50,000 to $500,000.

Waycross, Ga.—The Waycross Electric Light and Power Company has decided to make improvements to its plant.

Flora, Ind.—The LeBaw Electric Company, city, has been incorporated to furnish light; capital, $10,000.

Oakland City, Ind.—Council has granted the second gas franchise within the last three months; last one was given the Oakland City Light, Fuel and Power Company, a corporation of Vincennes and local capitalists, which owns the Nixon gas well in the local field; contract provides for a rate of 20 cents a thousand cubic feet for domestic and 8 cents a thousand for manufacturing purposes; company has already purchased material for the construction of its gas mains.

Princeton, Ind.—W. A. McLaughlin, of the Oakland City Light and Fuel Company, will ask Council for a franchise to pipe Princeton for natural gas and furnish the gas at 30 cents a thousand cubic feet; company proposes to pipe the gas to Princeton from the Oakland City field, a distance of about 18 miles.

Vincennes, Ind.—The Lincoln Oil and Gas Company will soon ask for bids for laying a pipe line for natural gas.—George B. Watson, President.

El Dorado, Kan.—Citizens have decided to ask Council to call an election to vote $20,000 bonds for the purpose of prospecting for oil and gas in this city.

St. John, Kan.—Burns & McDonnell, Scarritt Bldg., Kansas City, Mo., have prepared plans for a municipal lighting plant.

Springfield, Mass.—A new electric transformer station will be built at Brightwood by the United Electric Light Company for the use of Brightwood manufacturers; a lot has been purchased; to this station 6,000 volts will be sent and will there be transformed to 440 volts.

Taunton, Mass.—The Special Aldermanic Committee on Street Lights has voted to advertise for bids for the lighting and care of naphtha, gas and kerosene street lights for the ensuing year.

Windsor, Mich. — Alderman Sheppard, Chairman Special Power Committee, has estimated that it will cost about $130,000 to build a distrbuting plant and lines to sell Niagara power.

Hawley, Minn.—Citizens have voted to install an electric light system.

Owatonna, Minn.—The Public Service Operating Company will install a 300-hp. 18x36 Allis-Chalmers Corliss engine and two 150-kw. 2,300-volt electric generators.

Mathiston, Miss.—W. J. Buckingham is considering installation of electric light plant.

Mount Olive, Miss.—Citizens have voted bond issue for construction of electric light plant to be operated in connection with water plant; will install 80-hp. plant of five arc lights and about 1,000 incandescent lights; Engineer not yet selected.—A. K. Worthy, Mayor.

El Dorado Springs, Mo.—B. F. Proctor has been given a franchise to install an electric light system; work will begin at once.

Long Pine, Neb.—S. H. Kyner has decided to install machinery in his mill to light the village.

Omaha, Neb.—The 500 block business men are figuring on new street lights on the iron post and bracket style.—W. D. Williams is interested.

Plainview, Neb.—Bids will be received for the purchase of a franchise for an electric light plant.—H. J. Nelson, City Clerk.

Littleton, N. H.—A project for the construction of three huge dams on the Connecticut River, involving the investment of between $5,000,000 and $6,000,000 of capital, is being advanced by a number of Chicago capitalists; plans provide for the erection of three dams, one of which would be 160 feet high, which, it is claimed, would be higher than any other dam in the country; they would be situated at lower Waterford, Vt., Monroe and Dalton, with a separate power plant at each town; investigators, who have been working on the scheme for several months, include C. E. Everett of Chicago, a representative of Chicago and New York capitalists; Carl A. Ross, a Chicago attorney, and two engineers, A. Danville of Chicago and G. H. Gilbert of New York.

Bloomingdale, N. J.—The Butler Gas, Lighting and Heating Company has asked County Freeholders for permission to erect poles in the village.

Glassboro, N. J.—Borough has advertised for bids for town lighting by electricity only.

Hoboken, N. J.—The Citizens Light, Heat and Power Company has subscribed $32,252 of stock toward the forming of a corporation by citizens of the city for the purpose of erecting a light, heat and power plant to supply city at a charge less than is now charged for electric lighting by the Public Service Corporation; corporation will also enter the field for gas lighting, establish a sewage pumping station or stations, supply heat, power, steam and lay pipes or conduits beneath principal streets of the city.—Chas. F. Mattlage, A. H. Bruggemann, W. L. E. Keuffel, Frank Cordts and A. J. Volk are interested.

Jersey City, N. J.—The Monticello Avenue Improvement Association has asked the Street and Water Board for more lights.—Immanuel Britten is interested.

Perth Amboy, N. J.—On account of inability to effect a satisfactory agreement with the Public Service Corporation, the business men on Smith street, between High and State streets, who recently organized the Merchants' Progressive Association, have decided not to delay the establishment of the "Great White Way" any longer and will build an independent plant in the rear yard of either Gannon & Sheehy's or C. A. Sexton's stores.

Auburn, N. Y.—Plans are being considered by the New York, Auburn & Lansing Railroad for the erection of a power plant on Fall Creek.—H. A. Clarke, Auburn, General Manager.

Fulton, N. Y.—The Fulton Light, Heat and Power Company is considering a $500,000 expenditure for the purchase of water powers and the installation of a large hydro-steam electric plant.

Sheldrake, N. Y.—Fire has destroyed the power house, heating plant and pumping station of the new Sheldrake Springs Sanitarium.—T. H. Mitchell, President.

Wake Forest, N. C.—City will install electric light plant; cost, $12,000.—B. Parks Rucker, Charlotte, N. C., Engineer in Charge.

Grand Forks, N. D.—Mayor J. D. Taylor has recommended proposed ornamental system of street lighting.

Cincinnati, O.—Council is considering the lighting of Fountain square.

Columbus, O.—The East Side Citizens' Association will award contracts at once for installation of a series of Tungsten lamps and poles to be erected east and west of Miller avenue on Main street; there will be 36 of these lights in all.—Wm. Hansberger and H. S. Valentine, Committee.

Dayton, O.—The Dayton Lighting Company will extend underground system from Webster to Commercial streets.

Defiance, O.—If Council grants the new owners of the People's Gas and Electric Company plant a new franchise and lighting contract, the owners will expend $50,000 in rebuilding the plant; new owners represent the Consolidated Gas and Electric Company of Ithaca, N. Y., which controls the stock in the company.

Lorain, O.—The Board of Service has given up the idea of entering into a two-year contract for city lighting; instead the Servers have rejected all lighting bids and have instructed the Clerk of the Board to readvertise for bids on a five and ten-year contract; new bids must contain figures on the latest type of lamp and iron poles or they will not be considered.

Muskogee, Okla.—The Muskogee Electric Company has been incorporated by R. J. Johnson, G. W. Walker and Ed Hirsh.

Eugene, Ore.—The suit to enjoin the city from building its power plant to cost $130,000 has been decided in favor of the city and work on the project will probably be started at once.

Beaver Falls, Pa.—College Hill Borough has authorized the issuing of $15,000 bonds to build an electric light plant.

Clifton, Pa.—Clifton Power Association is considering the lighting of the village.—Augustus Nathan is interested.

Johnstown, Pa.—Council is considering the installation of lights on Kennedy avenue, Harrison street, Boyer street and School alley, Huter and Horrocks streets, on Peter street and at M street and Bhrom avenue.

Philadelphia, Pa.—The Frankfort Avenue Business Men's Association is urging the installation of at least five additional electric lights in blocks between Montgomery and Lehigh avenues.

Scranton, Pa.—The Joint Appropriations Committee has granted a $1,095 appropriation for fifteen new electric lights.

Lexington, S. C.—Jas. V. Jackson, Augusta, is considering construction of a water power electric plant on Saluda River; Lamar Lyddon and Louis Dunbar, New York, have made preliminary investigation.

Sumter, S. C.—The Police and Sanitary Committee is securing data concerning prices paid by other cities for street lights in order to compare these prices with the bid offered by the Sumter Ice, Light and Power Company.

Arlington, S. D.—The Lake Preston Milling Company has decided to install an up-to-date electric light plant.

Groveton, Tex.—The Groveton Light and Ice Company will increase capital stock from $20,000 to $25,000.

Houston, Tex.—The Stone & Webster Engineering Corporation, Stone & Webster Bldg., Boston, Mass., will expend $150,000

for improvements to power house of Houston Electric Company.—David Daly, Manager, Houston.

Houston, Tex.—The Galveston-Houston Interurban Railway will erect power house near this city; proposed plant will probably have capacity of 2,000 kilowatts and will cost $800,000; plans not yet prepared.—W. L. Locke, Houston, Construction Engineer.

Snyder, Tex.—Brumbach & Crouch, Cleburne, have secured franchise for an electric light plant and will complete plant in about six months.

Dayton, Va.—Silver Lake Improvement Company, W. D. Heatwole, President, contemplates installing water power electric plant.

Norfolk, Va.—The National Board of Fire Underwriters has recommended that all overhead wiring except trolley wires in the streets, alleys and block interiors be placed underground and the use of distributing poles be discontinued.

Portsmouth, Va.—City has not yet let contract for the purchase of a franchise for lighting the streets and for furnishing electric power where required.

Royalton, Vt.—The South Royalton Power Company has been incorporated to furnish power for this city and South Royalton; capital, $10,000.

Asotin, Wash.—The Anatone Light Company has been granted a 25-year franchise to construct and operate an acetylene light plant.

North Yakima, Wash.—City will have a central heating plant by which the business districts and a portion of the residence districts will be heated; last will be in operation before the return of cold weather in the fall; after investigation, articles of incorporation of the Yakima Central Heating Co. were filed with the County Auditor. The trustees of the corporation are: Alex Miller, A. E. Larson, O. A. Fletcher, H. B. Scudder and John L. Hughes; besides furnishing light, the company will furnish hot water on a meter basis; company is capitalized at $100,000.

Seattle, Wash.—The Entiat Power Company will increase its capital stock to $200,000; company will install one of the largest plants in central Washington.

Seattle, Wash.—Residents of Lincoln Beach and Fauntleroy Park district have offered to raise whatever sum is necessary to secure an immediate extension of the West Seattle lighting system into the district.

Seattle, Wash.—Council has passed bill providing for cheaper lights on Third avenue, Occidental avenue and Second avenue South.

Spokane, Wash.—The Washington Water Power Company, Front avenue and Lincoln street, will erect a three-story power station on Howard street; cost, $50,000.

Tacoma, Wash.—The B. C. Electric Company will establish a generating plant on the Jourdan River to generate 10,000 and to cost at least $2,000,000.

Washougal, Wash.—C. W. Cottrell, city, will construct a power plant; cost, about $10,000.

Romney, W. Va.—Council has granted the franchise applied for by the Interstate Natural Gas Company; under the terms of the franchise, work will begin within two years and gas furnished within three years, otherwise the franchise is void.

Collingwood, Ont., Can.—A syndicate headed by J. P. Charlebois has been formed to develop water power on the Osler property, which has been purchased for this purpose; total expenditure involves $100,000.

Fernie, B. C., Can.—Municipality is considering the ownership of the electric light and water plant, which is at present owned by the Crow's Nest Pass Electric Light and Power Company, Ltd.

Listowel, Ont., Can.—Citizens have voted in favor of a municipal lighting system.

Owen Sound, Ont., Can.—Citizens will vote May 15 on by-law authorizing $30,000 for electric light extension and debt.

Portage la Prairie, Man., Can.—Charter for the new electric light and power company for this city has been received from the Provincial authorities; construction of the plant has been postponed until the submittal of a by-law authorizing the local franchise.

Winnipeg, Man., Can.—The Street Railway Company is contemplating improvements, including erection of power substations and rebonding tracks.

BIDS RECEIVED AND CONTRACTS AWARDED

New Britain, Conn.—Contract for three years has been signed with the Connecticut Company for 180 arc lights at $85, with the privilege of a five-year renewal.

New Bedford, Mass.—Council Committee on City Property has voted to award the contract for electrical work on the municipal office building to the Eastern Electric Company, low bidders, for $19,600.

Albemarle, N. C.—The Albemarle Development Co. has awarded contract to L. A. Moody, city, for construction of dam to develop water-power and transmit electricity for power and lighting.—J. C. Masters, President.

Ellendale, N. D.—The Board of Trustees of the Ellendale Industrial School, President F. L. Walker, opened bids for the following work: For installing an electric light plant and wiring buildings and grounds contract to Pioneer Electric Company, of St. Paul, Minn. This firm's bid was the lowest, being $3,200. C. Leppe Construction Company, of Aberdeen, was awarded the contract to erect a power house and mammoth chimney to cost $6,481. H. C. Briley, of Ellendale, was awarded the contract to install a heating system in the power house to cost $612.50.

University, N. D.—Melby & Standal, of Grand Forks, have secured contract for construction of a building for the power and lighting plant for University of Dakota; the building is to be completed by August 1.—J. W. Wilkerson, Secretary Board of Trustees.

Wilkes-Barre, Pa.—The School Board opened bids, April 22, for the mechanical equipment of the proposed power and heat plant that the school district will erect at the rear of the present High School building. The bids submitted and the work for which the figures were given are as follows:

Boilers, Breeching and Stack.—Babcock & Wilcox, Philadelphia, $14,116. If pressed brick front is omitted $450 to be deducted from figure and in case of the coping being dispensed with an additional $140 is to be deducted. Heine Safety Boiler Company, St. Louis, Mo., $10,955. In case of omission of pressed brick front this figure is to be reduced by $105 and by $70 in case of coping being omitted.

Power Plant, Heating and Ventilating.—W. M. Anderson, Philadelphia, $46,450; B. G. Carpenter Co., city, $44,377; J. W. Danforth Co., Buffalo, N. Y., $42,250; S. Faith & Co., Philadelphia, $53,393; Peter Forve Co., city, $65,944; Gaylord Butler Co., Scranton, $61,714; Gaylord Eitapence Co., Scranton, $44,948; Gunster Bros., Scranton, $45,692; M. W. Hill, Philadelphia, not read; Edward Joy, Syracuse, N. Y., $41,991; E. Rutzler Co., New York, N. Y., $43,744; Schuler Bros., city, $48,785; Storms & Co., Newark, N. J., $39,698; Weiss Jones, city, $48,867; Welles & Newton, New York, N. Y., $53,845; York Engineering Co., York, $50,989.

The firm of M. W. Hill, Philadelphia, failed to send a certified check with their bid referring the directors to their bonding company and the success of the work that they have done in all sections of the country. As this failed to comply with the requirements the bid was not opened.

Electrical Work.—Electric Motor Equipment Co., Newark, N. J., $29,750; General Electric Inspection Co., Newark, N. J., $28,839; A. Harlfinger, Newark, N. J., $37,000; Edward Joy, Syracuse, N. Y., $30,954; E. F. Roth, city, $30,282; Shepherd & Rust, city, $25,425; Edward L. Simons, Philadelphia, $42,337; Wheeler Green Co., Rochester, N. Y., $32,987; Cortland Engineering Co., Cortland, N. Y., $32,173.

Greenville, Tex.—The J. W. Maxcy Company, of Houston, has been awarded a contract for engineering and constructing the Greenville electric light plant; cost, $60,000.—W. A. Frazer, City Clerk.

Winnipeg, Man., Can.—The Williamson Construction Company has sublet the contract for clearing, corduroying and ditching the right-of-way for the Winnipeg municipal power transmission line from the city to Point du Bois to J. D. Houston and M. Berger, of Winnipeg; the work will begin at once.

FIRE EQUIPMENT

Birmingham, Ala.—The Finance and Fire Committee has recommended the purchase of a lot on Fourteenth street as a site for a fire station.

Mobile, Ala.—Citizens of Plateau have organized a chemical fire company; engine, cost $825, will be purchased.—Chas. Ditmars, Secretary.

Oakland, Cal.—The Board of Public Works has been authorized to purchase fire alarm boxes.

Hartford, Conn.—Mayor E. W. Hooker has recommended the erection of a new central fire station, combining headquarters and No. 3.

New Britain, Conn.—Chief R. M. Dame has recommended the installation of several fire companies in the southwest section of the city; also the purchase of 500 feet of hose.

Savannah, Ga.—City has decided to purchase an automobile for the Chief.

Kendrick, Ida.—City will install an electric fire alarm system.

Moline, Ill.—Architect H. W. Whitsett is preparing plans for a two-story fire station.

Michigan City, Ind.—Councilman Commens has presented a resolution authorizing the Board of Public Works to procure, at the expense of the city, one rubber coat and one pair of rubber boots for each member of the fire department.

Dubuque, Ia.—Chief Reinfried has recommended the purchase of fire nets, small engine on the hill, and repairs to hook and ladder wagon.

Fontanella, Ia.—Citizens have organized a volunteer fire company.—Wm. Welscher, Chief.

Salina, Kan.—W. H. King has asked Council for permission to organize a volunteer department in Wesleyan, subject to instruction by Chief Budbeck.

Salina, Kan.—Mayor C. B. Kirtland has recommended the organization of a paid fire department, also the exchange of old equipment for modern and better.

Paducah, Ky.—City is considering need of 4,000 feet of hose, six new fire alarm boxes and more fire plugs.—James J. Wood, Chief.

Eunice, La.—Citizens will organize a fire company and purchase equipment.

New Orleans, La.—The Fire Alarm office has asked for $20,000 to install 35 fire alarm boxes in suburban parts and the removal and placing of the fire alarm cables to the underground system on Lafayette street.

Boston, Mass.—The Board of Aldermen has passed bill providing $85,000 loan for fire department.

Chelsea, Mass.—City has decided to spend $20,000 on fire sprinklers for the Eastern section.

Fitchburg, Mass.—Town has voted $3,500 for an auto flying squadron.

Gloucester, Mass.—Council has adopted order appropriating $2,600 for repairing steam fire engine Bay View.

Great Barrington, Mass.—Town has voted to appropriate $500 for hose and play pipe and $600 for fire alarms.

Taunton, Mass.—Chief Damon Milford has recommended the reconstruction of the old steamer Charles Albro; cost, $2,300.

Webster, Mass.—Town will purchase an auto truck.

Fergus Falls, Minn.—Council has decided to purchase a new chemical engine, hose wagon and new hose.

Winona, Minn.—Fire Marshal W. C. Norton has recommended the purchase of a 75-foot automatic quick raising aerial truck, one combination hose and one combination chemical wagon, the installation of a 30-gallon chemical tank on a hose wagon, a Monitor hose nozzle, one revolving cellar nozzle, and 500 feet of hose.

Kansas City, Mo.—City will purchase several sites in the outlying districts for engine houses.—Chief Egner.

Camden, N. J.—Council has adopted a resolution authorizing a $30,000 bond issue to complete the fire and police alarm system in the city.

Cape May, N. J.—Citizens of Cape May Court House will meet soon with the object of purchasing a chemical engine to be used with the hook and ladder company.

Newark, N. J.—The Fire Board has passed $4,000 in budget for the purchase of an automobile for Chief Astley; improvement of fire alarm telegraph system is also being considered.

North Bergen, N. J.—The Fire Committee has recommended the purchase of new hose wagons for the Eclipse, Overlook, Homestead and Excelsior companies and a combination truck for the American company.

South Orange, N. J.—The Hill Independent fire department will secure new apparatus.—William Condron, President.

Trenton, N. J.—City Counsel C. E. Bird is drafting ordinance authorizing a bond issue for the purchase of a self-propelled fire engine.

Albany, N. Y.—Architects Woolet & Judson are preparing plans for a two-story addition to the Protection Fire Patrol building; cost, $5,000.

Buffalo, N. Y.—City will purchase an automobile for Assistant Chief Murphy; cost, $1,500; also expend $17,000 on a new fire house.

Flushing, L. I., N. Y.—Deputy Fire Chief John O'Hara will recommend installation of a new engine at house of Company No. 172.

Mt. Vernon, N. Y.—Town is considering purchase of 2,000 feet of hose and the equipping of truck with a water tower.—Fire Chief Howard.

Newtown, N. Y.—Town is considering purchase of 3,000 feet of new hose.

New York, N. Y.—Mayor McClellan has approved ordinance appropriating $100,000 to provide for alterations to fire headquarters in East Sixty-seventh street.

Poughkeepsie, N. Y.—Common Council has rejected bids received for $15,000 Fire Department building; Architect P. M. Floyd

will revise plans and new bids will be asked.

Lenoir, N. C.—Citizens have organized a fire department; apparatus and equipment will be purchased for two hose companies.

Bismarck, N. D.—City will ask new bids on 1,000 feet of hose.

Grand Forks, N. D.—Mayor J. D. Taylor has recommended purchase of a hook and ladder truck.

Dayton, O.—Second Ward citizens are urging the erection of an engine house.

Bradford, Pa.—City will purchase a site on Chestnut street for a fire house.—Mayor Hoffman.

Elwood City, Pa.—Borough is considering the purchase of a motor truck.

Hazleton, Pa.—The Fire Committee has decided to repair the hose cart at East End fire house.

Reading, Pa.—Council is considering the purchase of a $4,500 engine for the Union Fire Company; also an ordinance appropriating $50,450 for Fire Department.

Scranton, Pa.—The Joint Appropriation Committee has granted $500 appropriation for two new fire alarm boxes in the Bellevue District.

Williamsport, Pa.—Fire Chief Stryker has recommended the replacing of some of the older sections of fire hose.

Wimber, Pa.—Citizens have taken steps to install a fire alarm system.—Ed Mills, Chairman Fire Committee.

Newberry, S. C.—The Board of Fire Underwriters, H. B. Wells, Chairman, has recommended that the city install an improved fire alarm system and provide extinguishers for the fire wagon.

Memphis, Tenn.—Senate has passed bill allowing city to issue $260,000 bonds to build a new engine house and police station.

Applachia, Va.—Fire has destroyed a good part of the town; there is no fire protection.

Norfolk, Va.—The National Board of Fire Underwriters has recommended the establishment of a fire boat company, equipped with a modern steel hull fire boat with pumps of at least 7,000 gallons capacity and carrying 1,000 feet of three-inch hose; the providing of two hose wagons as fire boat tenders; the making of Engine Company No. 3 a combined engine and ladder company; the establishment of an engine in the house recommended by the Chief on Grandby street and the provision of other minor equipment; also the establishment of new quarters in the vicinity of Lewellyn avenue.

Montreal, Que., Can.—Plans are being prepared for four new fire houses.

Weston, Man., Can.—Citizens will vote on by-law to raise $23,000 for the erection and equipment of a fire hall.

BIDS RECEIVED AND CONTRACTS AWARDED

Louisville, Ky.—Alterations are to be made at Engine House No. 2, adjoining the City Hall, to cost $1,800, and the award for the work has been given to Keller & Sons.

Baltimore, Md.—The city has awarded a contract for the erection of the new fireboat station, Pier 7, at President and Lancaster Streets, to J. Cushen, who will begin work at once; the building will be constructed on piles and will be two and a half stories high. It will be 38 by 76 feet. Asbestos shingles will cover the roof and the other part of the building will be made as near fireproof as possible. The cost will be about $15,000.—E. D. Preston, Inspector of Buildings.

Westfield, Mass.—The Committee appointed to purchase a motor truck for the Fire Department has voted to order a Pope-Hartford combination chemical and hose wagon, the price of which is $3,500; the truck, which will be delivered in July, is to carry a 40-gallon chemical tank, 250 feet of chemical hose, 1,000 feet of water hose, besides extra lanterns, axes, pikes and similar apparatus. It is not to be less than 40-horsepower, and may be geared to any desired speed; the machine will weigh 6,000 pounds and a powerful searchlight will be mounted on a swivel on the dashboard, lighted by touching a button; this is additional to the regular acetylene lamps, and is for the purpose of assisting the firemen with extra light in case of a night fire.

North Bergen, N. J.—Bids for a new fire alarm tower and bell for Woodcliff Hose Company were received as follows: Charles F. Hermann Iron Works, of North Bergen, $775; Hudson Iron Works, of West Hoboken, $843; the bids were referred.

Poughkeepsie, N. Y.—The new house for Niagara Steam Fire Engine Company No. 2 will be built in accordance with the modified plans at a cost of $15,153, by James P. Hillery, to whom the contract was awarded by Council. The bids, as made at the last meeting of the Council and as amended to comply with the changed plans and specifications, were read as follows: James Forrestal, original bid, $16,082; revised, $15,000; James P. Hillery, original, $15,879; revised, $15,153; John O'Donnell, original, $17,970; revised, $15,978.

Rochester, N. Y.—In the bidding for 24 Gamewell fire alarm boxes "or others just as good," the Gamewell Fire Alarm Telegraph Company, of New York, bid $125 each for new boxes, offering an allowance of $70 each for twelve old boxes; the National District Telegraph Company, of New York, bid $110 each, with an allowance of $40 each for old boxes.

Norwalk, O.—The Board of Public Safety has opened bids for rebuilding the floor of the stable at the Fire Department with concrete and chemically treated blocks. The specifications call for 10 cubic yards of excavation; 30 cubic yards of filling; 12 cubic yards of concrete, and 50 square yards of blocks as follows: Streator & Shirley, $328.70; James Quinn, $288; Will Parker, $248.50; B. M. Adelman, $221.40; the last was the only one inside the estimate of the City Engineer which was $245.50; the Board delayed action on the bids.

Philadelphia, Pa.—Assistant Director Sheehan has received bids for the building of a fire, police and patrol station on Buttonwood Street, west of Tenth Street; fire station, police patrol, garage and stable building, at Belgrade and Clearfield Streets; police station and patrol garage, east side of Eighth Street, below Jefferson, and fire station, southwest corner Germantown Avenue and Bringhurst Street. The bids are as follows: Tenth and Buttonwood Streets Station, B. Ketchum Sons, $64,957; Henry E. Baton, $64,032; James G. Doak & Co., $60,875, and John R. Wiggins, $62,538. Fire house, Germantown Avenue and Bringhurst Street, B. Ketchum Sons, $38,839; Mitchell Brothers, $40,492; John R. Wiggins, $35,634; James G. Doak & Co., $34,282; Henry E. Baton, $36,687, and Abel Bottom & Sons, $34,900. Fire station, Belgrade and Clearfield Streets, B. Ketchum Sons, $77,558; Henry E. Baton, $79,187; James G. Doak & Co., $78,539; John R. Wiggins, $76,000. Police station and patrol garage, Eighth and Jefferson Streets, B. Ketchum Sons, $49,927; Mitchell Brothers, $56,579; Thomas Riley, $60,053; John H. Jordan, $52,634; Henry E. Baton, $49,400; James Doak & Co., $47,879, and John R. Wiggins, $49,400.

Wilkes-Barre, Pa.—Several contracts were awarded by the Fire Committee of Councils. Bids were opened for the furnishing of 1,500 feet of hose and this contract was awarded the Eureka Fire Hose Company at the rate of $1.10 per foot. Contracts for supplies such as brushes and brooms were divided between Phelps, Lewis & Bennett Co., and the White Hardware Company.

East End is to have the handsome new hose house as the Public Property Committee has awarded the contract for its erection to A. M. Hildebrand, according to the plans and specifications submitted by architect Henry Maier. The cost of the new structure is to be $13,915, which was the lowest bid among the eleven submitted.

ELECTRIC RAILWAYS

Huntsville, Ala.—Surveyors have been sent out by the Huntsville, Chattanooga & Birmingham Interurban Railway Company to find the best route for an electric railway between this city and Birmingham; one preliminary survey crosses the Tennessee River at Deposit and goes down Brown's valley.

Phoenix, Ariz.—Citizens have voted in favor of granting the proposed street railway franchise.

Little Rock, Ark.—Council has passed an amendment to the franchise of the Little Rock Railway & Electric Company, which provides for the extension of the Union depot line along Water street.

Los Angeles, Cal.—The Glendale & Eagle Rock Railway has been incorporated to build a 2½-mile street railway from Eagle Rock to Glendale; capital stock, $25,000.—E. D. Goode, R. E. Goode and George Benson, Directors.

Sacramento, Cal.—The Vallejo & Northern Railway was the lowest bidder for a franchise in this city.

San Francisco, Cal.—Mayor has signed ordinance calling for an estimate from the City Engineer as to the probable cost of reconstructing the Geary street railroad into a trolley, with the ultimate purpose of running it as a municipal road.

Denver, Col.—The details preliminary to the letting of the contracts for the construction of the electric railroad between Denver and Colorado Springs by the Denver, Colorado & Pueblo Interurban Company, have been completed and the contracts will be awarded within the next two weeks; line will cost about $1,750,000 for the first section and the arrangements have been completed for the underwriting of the entire bond issue which is to furnish the money for construction work.

Denver, Col.—The Denver City Tramway Company will start work on May 15 on its proposed Pearl street extension.

Danbury, Conn.—The Danbury & Bethel Street Railway Company has applied for an extension of its charter giving it the right to extend its line to Brewster, N. Y.—M. H. Griffing, Secretary.

Washington, D. C.—An American consular officer in a Latin-American country, replying to an inquiry from the United States, reports that it is possible that a few miles of narrow-gauge railroad, together with a small wharf and custom-house buildings, will shortly be constructed in the city in which he is located. He states that if American firms interested in this project desire to send to him catalogues of implements, railway supplies and other material needed, he will be pleased to see that they get into the hands of parties who are likely to be interested in the event that anything may be done regarding the matter. The Boletin Oficial of Argentina recently published a decree authorizing the General Directorate of Railways to solicit tenders for the supply of 190 flat-bottomed trucks, 35 tank wagons and 30 covered trucks for use on the Patagonian railways.—Address No. 3347, Bureau of Manufactures.

Tampa, Fla.—The Tampa Sulphur Springs Traction Company will soon place contracts for the construction of three miles of new track.—L. Brill, General Manager.

Augusta, Ga.—The Augusta Railway & Electric Company will make improvements on its local lines; also on the Augusta-Aiken division.—James R. League, General Manager.

Marshfield, Ida.—The Coos Bay, Oregon & Idaho Railway has been incorporated to construct a railway from Coos Bay, Ore., east via Roseburg, to Boise, Ida.—William Grimes, Henry Sengstacken, J. V. Pugh, J. C. Gray, John R. Smith and P. Hennessey, Incorporators.

Ottawa, Ill.—The street car line of the Northern Illinois Light & Traction Company in South Ottawa and the line on La Salle street are to be rebuilt this summer.

Springfield, Ill.—A charter has been issued for the St. Louis & Chester Railroad to be constructed from East St. Louis through the counties of St. Clair, Monroe and Randolph to Chester; incorporators are: Rudolph Stecher of Murphysboro and Eugene W. Ziegenheim, Richard A. Slack, Edward Schiwitz and William F. Benezen, all of East St. Louis.

Streator, Ill.—The Illinois Light & Traction Company will soon place contracts for the construction of one mile of new track.

Albia, Ia.—The Albia & Hocking Interurban line is considering an extension into Buxton Fields.

Bangor, Me.—A preliminary survey has been ordered by the Bangor Railway & Electric Company for an extension to the Charleston division of the lines running from Bangor, which will eventually reach Waterville, 52 miles west of this city; extension will begin at East Corinth and will run to Dexter, then through the towns of St. Albans, Hartland and Canaan, Skowhegan to Waterville; this proposed road will link Bangor, by trunk line, to the westward; in connection with the new road a branch line from Dexter north to Denver and Foxcroft is contemplated.

Baltimore, Md.—The Orangeville Improvement Association is urging the extension of the Monument street electric car line to Orangeville.—R. H. Hopkins is interested.

Baltimore, Md.—The West Baltimore Business Men's Association is urging a car line on South Carey street, which is the only street running south to Columbia avenue between Poppleton and Monroe streets.

Springfield, Mass.—The Springfield Street Railway Company will spend about $80,000 this year for improvements, including new tracks, wire and electrical equipment.—H. C. Page, General Manager.

Breckenridge, Minn.—Joseph Gunn, city, has about completed arrangements to construct a railway between this place and Wahpeton, N. D.

Litchfield, Minn.—The Electric Short Line Railroad Company, Minneapolis, has applied to County Board for permission to cross county roads in the towns of Cedar Mills and Cosmos.

St. Louis, Mo.—The St. Louis, Webster & Valley Park Railway Company has nearly completed grade for its line; tracklaying will begin soon.

Trenton, N. J.—As the successor of the Trenton, Lakewood & Atlantic Railway Company, the Lakewood & Seashore Railroad Company, with headquarters in Lakewood, has been incorporated at the State House; capital stock of the new corporation is $300,000. Incorporators are as follows: Charles R. LeCompte, Lakewood; James H. Butcher, Ardena; J. Arthur Butcher, Ardena; Ernest E. LeCompte, Lakewood; Harry J. Terwilliger, Lakewood;

Nicholas MacDonald, Lakewood, and Roderick A. Clark, Point Pleasant.

New York, N. Y.—The Public Service Commission has ordered all trolley companies of Manhattan, Brooklyn, Queens, Richmond and the Bronx to equip their cars with fenders and wheel guards.

Southhold, L. I., N. Y.—An application has been presented to the Town Board by John E. Root, George W. Reeves, Frederick E. Lewis, George F. Stackpole and J. Madison Wells for the consent of the Board to enable the petitioners to construct and operate a street surface railroad from Riverhead, through Southold town, to Orient Point.

Troy, N. Y.—The Public Service Commssion has ordered the United Traction Company to completely vestibule the front and rear platforms of all enclosed motor passenger cars to be operated by it in Albany and Rensselaer counties during December, January, February and March, and that the necessary change shall be completed before November 1, 1909.

Mansfield, O.—The Sandusky, Norwalk & Mansfield Railway Company has secured right-of-way between Shelby and this city for the extension of its Sandusky-Shelby line to this city.—J. A. Bartholomew, President.

Wauseon, O.—The Defiance, Napoleon & Wauseon Railway has been incorporated for the purpose of building a railway, to be operated between this place and Defiance.—Charles E. Bennett, J. Walter Bennett, Jay H. Miller, W. W. Campbell and Henry Rohrs, Incorporators.

Youngstown, O.—The Mahoning & Shenango Railway & Light Company will extend the Albert Street line from Himrod Avenue to Fruit Street.

Hood River, Ore.—The Valley Electric Railway Company has been organized to develop an electric line from the valley into the Mount Hood country.

Chester, Pa.—Casper P. Faucett, of Westtown, Secretary and Treasurer of the West Chester & Wilmington Electric Railway Company, has announced that the Directors are favorable to the line being built this year; line will run through a section of Delaware County not at present covered by any trolley route.

Freedom, Pa.—Engineers have completed a survey for E. B. Shilton, of Freedom, and Pittsburg capitalists for a proposed street car line from Freedom to Criders Corners, where it meets the Harmony line; part of the right-of-way has already been secured.

Lewistown, Pa.—The Lewistown & Reedsville Electric Railway Company has been reorganized by the election of the following officers: President, J. Irving Quigley, of Lewistown; Vice-president, John E. Zimmerman, Philadelphia; Treasurer, Charles Day, Philadelphia; Directors: J. E. Zimmerman, A. A. Stevenson, D. A. Pearson and Charles Day, of Philadelphia, and J. I. Quigley and A. B. Spanogle, of Lewiston, and W. P. Stevenson, of McVeytown; extensions will be made.

Philadelphia, Pa.—Citizens are urging the construction of a trolley line down Frankfort avenue from Bridge street, Frankfort, to the center of the city.

Pittsburg, Pa.—Work will soon be commenced by the Jefferson & Wilson Street Railway Company and the Peters Creek Street Railway Company on the construction of a street car line costing approximately $300,000, to connect Glassport, Coal Valley, Wilson, Blair and Clairton; connection will be made with lines of the Pittsburg Railways Company; construction of the new line will necessitate a new steel bridge across the Monongahela River.

Pittsburg, Pa.—Council has passed ordinance to employ an expert for $5,000 to investigate the street car conditions.

Sunbury, Pa.—The Montandon & Milton Electric Railway has been chartered to build a nine-mile street railway from a point in West Chillisquaque Township to Milton.—W. H. Lyons, Sunbury, President.

Towanda, Pa.—Council has granted a franchise for 99 years, conditional that work must be commenced within one year and pushed forward expeditiously under penalty of forfeiture, to the Bradford County Traction Company to build a borough street railway system.

Waynesburg, Pa.—Promoters of several trolley lines radiating from Waynesburg have decided to proceed immediately with the construction of a line from Waynesburg to Claysville by way of Prosperity, with a spur from the latter point to Washington; surveys have been completed and the rights-of-way secured.

Georgetown, S. C.—The Georgetown Railway & Light Co. will begin construction of the street railway this summer. H. C. Case, 2215 Land Title Bldg., Philadelphia, Pa., President.

Greenville, Tenn.—P. C. Ottinger, Knoxville, is securing right of way for an electric railway between this city and Newport.

Houston, Tex.—The Houston Electric Company is considering some extensions to line.—David Daly, Manager.

Rockdale, Tex.—J. F. Coffield, city, is promoting the building of a broad-gauge electric railway between this place and Florence; distance, 60 miles.

Waco, Tex.—The Waco Electric Street Railway has accepted the city grant for extension and will build three or four miles of line to the east of the Brazos River.—Henry C. Scott, President.

Weatherford, Tex.—Movement for the construction of the Chicago, Weatherford & Brazos Valley Railway is well under way; managerial committee has been appointed, consisting of Joel W. Hicks, R. W. Kindel, C. C. Littleton, W. D. Taylor, C. C. Barthold and R. L. Stennis; movement contemplates the immediate building of a line from this city to a connection with the Rock Island a Bridgeport and with the Fort Worth & Denver at Decatur.

Lynchburg, Va.—The Board of Supervisors of Campbell County has accepted the final proposition of the People's Improvement Company, and this insures the extension of the Diamond Hill street car line from its present terminus at Seventeenth and Kemper streets over Campbell avenue to the Fairview Heights school building; extension is to cost $20,000.

Lynchburg, Va.—A street railway extension will be made to Fairview Heights, distance about one mile. R. D. Apperson, President and General Manager of the Lynchburg Traction & Light Company.

Bellingham, Wash.—The Whatcom County Railway & Light Company will extend its line on the south side this summer at a cost of about $12,000.

Seattle, Wash.—Residents of Queen Ann Hill are urging adequate street car service, and the Seattle Electric Company has petitioned for rights on Tenth Avenue West and other streets, in order that extensions may be made.

Spokane, Wash.—The Spokane, Inland & Empire Railroad Company has applied for a franchise for three miles of new street car lines.

Grafton, W. Va.—The Grafton Traction Company has decided to extend its line west to Flemington; distance, 10 miles.—John T. McGraw, President.

Wheeling, W. Va.—The Joint Committee of Railroads, Ordinances, Streets, Alleys and Grades is considering application of the Rapid Transit Company of West Virginia for the grant of a franchise for the construction, maintenance and operation of an electric street car railway upon certain streets and alleys in the city.

Grand Rapids, Wis.—Final surveys have been started for a suburban street railway, which is to run between this city and Nekoosa.—R. N. Haskett, Wausau, Engineer.

Bracebridge, Ont., Can.—A proposition is mooted to construct an electric road from Bracebridge or South Falls to the mines.

Mexico City, Mex.—The Canadian Syndicate controlling the Mexico Tramway Company will construct an electric railway between this city and the city of Puebla; distance, about 160 miles.

BIDS RECEIVED AND CONTRACTS AWARDED

Pensacola, Fla.—The East Pensacola City Co. has awarded contract to the Stone & Webster Engineering Corporation of Boston to build its proposed street railway from Pensacola to East Pensacola; distance, 1 1-2 miles.—John E. Stillman, Manager.

Fairmount, W. Va.—Hamilton & Huffman have secured the contract for grading the extension of the Fairmount & Clarksburg Traction Company's line from East Park to the fair grounds.

BRIDGES

Tucson, Ariz.—City Engineer Dietrich is preparing plans for a reinforced concrete bridge to be erected over the Santa Cruz River at St. Mary's avenue; cost, about $8,000.

Malvern, Ark.—Hot Springs County Bridge Commission has decided to erect two bridges at Grigsby's Ford and Green's Ferry; cost, $25,000.

Berkeley, Cal.—The Junior Class will vote whether to erect a bridge and memorial arch south of the university at a cost of over $8,000; plans for the bridge and arch have already been prepared by Prof. John Galen Howard.

Napa, Cal.—City Engineer Buckman has submitted plans for the proposed bridge across First street; cost, $12,000; bond issue will be necessary.

Oakland, Cal.—Council has passed ordinance authorizing Board of Public Works to construct concrete culvert on Temescal Creek at Hardy street and on Glen Echo Creek at Grand avenue.

San Luis Obispo, Cal.—Citizens have voted to issue $40,000 bonds for bridges.—E. W. Clark is interested.

South Pasadena, Cal.—A bridge across the Arroyo Seco can be constructed for $60,000; the special Bridge Committee has reported that Los Angeles engineers have completed their figures for a concrete structure 900 feet long and 50 feet wide and that the cost would be considerably less than it was first thought that such a structure could be constructed for; a special committee consisting of Charles Packard of Highland Park, G. W. Wilson of Garvanza and Dr. Taylor of South Pasadena has been appointed to present the bridge proposition to the city officials of Los Angeles and South Pasadena, and also interview the County Supervisors regarding the bridge, which will open another route from South Pasadena to Los Angeles and cut off several miles from the present circuitous route which one has to follow in traveling between the two cities.

Grand Junction, Colo.—County Commissioners are considering the construction of a bridge at Main street.

Milford, Conn.—Vincent Clarke has completed surveys for a new concrete viaduct to be erected by this town.

Filer, Ida.—Commercial Club has appointed a committee to investigate proposition of building a bridge over the Snake River at Clark's grade.

Grangeville, Ida.—County Commissioners are considering plans for the construction of a wagon bridge over the Snake River at Goff; Legislature has appropriated $5,000.

Sandpoint, Ida.—Bonners Ferry has secured $33,000 for building a bridge over the Kootenai River.

Twin Falls, Ida.—Engineer R. S. Cookingham has commenced work on the survey of an electric railway from Twin Falls to the site selected for high bridge across Snake River canyon below Shoshone Falls; detailed plans of the bridge are now being worked out and W. S. Kuhn has given instructions that the work be hastened; this bridge will connect Twin Falls with North Side, and will be the highest bridge in the world.

Aurora, Ill.—The Road and Bridge Committee, Chairman Anderson, has decided to lay a plank roadway on the North avenue bridge; cost, $2,000.

Crown Point, Ind.—Lake County has awarded $37,500 bridge bonds to Wedding & Co. at $1,633.75 premium.

Mason City, Ia.—The Board of Supervisors has decided to construct a bridge over Willow Creek at South Main street; cost, about $18,000.

Storm Lake, Ia.—City and County will construct a new bridge at South Main street.

Salina, Kan.—Bids will be received by the Smoky Hill Township Board for the construction of a one-span 30-foot steel bridge, with 14-foot posts, across Mulberry Creek.—P. A. Weisgerber, R. I., Salina.

Paducah, Ky.—McCracken County will construct bridge across Clark's River.

Havre de Grace, Md.—The Pennsylvania Railroad Company has invited bids on rebuilding, for use of pedestrians and vehicles, its old bridge across Susquehanna River between Havre de Grace and Perryville; new draw span, 300 feet long, will be built; $95,000 is available.—A. C. Shand, Chief Engineer.

Boston, Mass.—The Board of Aldermen has passed bill providing a $20,000 loan for the Bridge Division of the Street Department.

Lynn, Mass.—The City Engineer has reported that it will cost $8,000 to inclose that part of Strawberry Brook which runs through the Little River playground in a concrete culvert.

Adrian, Mich.—The Wabash Railroad will replace three old high bridges with concrete arches and earth fills; bridges to be replaced are near Adrian and North Morenci.—A. O. Cunningham, St. Louis, Chief Engineer.

York, Neb.—County Commissioners will erect a new steel bridge over the Beaver at Lincoln avenue.

Laconia, N. H.—City has decided to rebuild the Church street bridge.—Charles E. French, City Engineer.

Morristown, N. J.—The Sewerage Commission is considering the erection of a bridge over the Whippany River at Knight's Pond, near Ridgedale avenue.

Buffalo, N. Y.—Assembly has passed bill providing for the construction of a bridge over the Erie Canal at Georgia street and making an appropriation for it.

Carthage, N. Y.—Engineer James R. Brownell has planned for the construction of a concrete culvert and bridge over the stream in South Mechanic street and also for the cutting down of the grade and the improvement of upper State street and Carr hill.

Syracuse, N. Y.—Automobile clubs are urging the repairing of the old free bridge at the foot of Cayuga Lake; about $1,200 is needed.

Dayton, O.—Bids will be received May 8, 11 a. m. for $20,000 bridge bonds.—F. E.

Tunison, Clerk Montgomery County Commissioners.

Youngstown, O.—Council has decided to construct an approach from Ridge Avenue to the Market Street Viaduct.—M. F. Hyland, Clerk.

Claremore, Okla.—Rogers County citizens will vote on $100,000 bonds for bridge and road construction.

Pendleton, Ore.—Bids are to be asked at once for the construction of a steel bridge across the Umatilla River at Lee Street.

Ashley, Pa.—Council is considering construction of a bridge over Prospect Street.

Philadelphia, Pa.—Council has passed an ordinance to permit the Quaker City Box Company to erect a bridge over and across Rosehill street.—J. E. Reyburn, Mayor.

Pittsburg, Pa.—Council has passed ordinance authorizing a $50,000 bond issue for reconstructing the Twenty-second street bridge.

Pittsburg, Pa.—The Jefferson & Wilson Street Railway Company will erect a new steel bridge across the Monongahela River.

Newport, R. I.—Commander Fullam of the Naval Training Station has asked the Navy Department for $80,000 for the construction of a new bridge and causeway.

Beaufort, S. C.—Citizens are considering the construction of a bridge connecting this city with Savannah.—Senator Christensen, city, is interested.

Bay City, Tex.—The Galveston, Harrisburg & San Antonio Railway will erect a bridge over Trespalacios River.—E. B. Cushing, Houston, Constructing Engineer.

Benton, Tex.—Polk County has authorized $25,000 bridge and road bonds.

Carthage, Tex.—Panola County citizens have voted $40,000 bridge bonds.

Hidalgo, Tex.—Hidalgo County will hold an election on $100,000 bonds for bridge and road purposes.

Roanoke, Va.—The Norfolk & Western Railroad will construct viaduct, including approaches, across railroad at Tinker Creek, in connection with proposed road from Roanoke to Cloverdale.—C. S. Churchill, City Chief Engineer.

Asotin, Wash.—The plans of Bowerman & McCloy for the Jerry steel bridge upon the recommendation of the County Engineer were adopted. Bids will be asked shortly for the construction of the bridge.

Everett, Wash.—Commissioners have decided to call for bids for the construction of a bridge across the Stillaquamish, near Florence.

Seattle, Wash.—Council has passed ordinance authorizing and directing the Board of Public Works to build a bridge on California Avenue across Fauntleroy Creek.

Spokane, Wash.—Council has adopted plans for a steel viaduct with concrete abutments to span the Great Northern, Oregon Railroad & Navigation Company's tracks at Walnut and Boone streets.

Tacoma, Wash.—The Commissioner of Public Works has recommended that Bridge No. 11 at South 11th Street be repaired at an approximate cost of $1,777.45; also notified Council that the Union Avenue Bridge between 31st and 33d Streets is unsafe.

Walla Walla, Wash.—Street Committee is considering the construction of a bridge across Bencher's Creek at North Main Street.

Winthrops, Wash.—Citizens have offered to donate $1,000 toward the construction of a bridge near this place.

Green Bay, Wis.—Alderman Felix Biemeret has requested that the Street and Bridge Committee submit an itemized report of the cost of repairing the west approach of Main street bridge; estimates will also be secured on the cost of repairing protection piers.

Janesville, Wis.—City is considering repair of the Milwaukee street, Fourth avenue and Monterey bridges and the replacing of the Spring Brook bridge with a new one.

Racine, Wis.—City is considering repairs of viaduct leading to State street bridge.

Guelph, Ont., Can.—Two bridges will be built this year; materials have not yet been decided on; tenders will be called for shortly; number of culverts will also be constructed.

London, Ont., Can.—County Engineer Talbot is busy on several bridge plans for the Middlesex County Council.

Toronto, Ont., Can.—City Engineer Rust will recommend the construction of a high bridge or swing bridge for cars at the western gap.

BIDS RECEIVED AND CONTRACTS AWARDED

Gadsden, Ala.—The Louisville & Nashville Railroad has awarded contract to American Bridge Co., New York, for construction of superstructure of bridge across Coosa River at Gadsden; will be built on present masonry.—W. H. C. Courtenay, Louisville, Ky., Chief Engineer.

Charleston, Ark.—Charles Miller, city, has been awarded contract to construct three steel bridges in Logan county; cost, $5,000.

Berkeley, Cal.—The Esterly Construction Company, city, has secured contract for building a bridge across Strawberry Creek at Telegraph avenue, entrance to campus of the University of California, for $8,787; this bridge will support the Sather Gate, which is to be erected at a cost of $40,000.—John Galen Howard, Architectural Bldg., Architect.

Pasadena, Cal.—Smith & Degryse had the low bid of $1,695 on the Mentor Avenue culvert.

J. E. Haddock was awarded the contract on the extension of the Stevenson Avenue culvert at $6.50 per foot.

Sacramento, Cal.—Bids were opened by the County Supervisors for constructing a steel bridge on concrete piers and abutments over Dry Creek and the American Construction Company, at $22,844, was low bidder.

Dover, Del.—The Kent County Levy Court has awarded contract for constructing a drawbridge over the Leipsic River to the Canton Bridge Company, of Canton, O., at $7,164.

Washington, D. C.—The G. & W. Manufacturing Company, 26 Cortlandt street, New York, has secured contract from the U. S. Engineering Office for movable and stationary lock gates, curtain gates and operating mechanism to be installed in bridge at inlet to Tidal Basin, Potomac Park, for $9,000.

Cedartown, Ga.—Polk County Commissioners have awarded contract to J. W. Houseal to construct concrete bridge on Cedartown-Rockmart road.—J. L. Moore, Chairman Commissioners of Roads and Revenues.

Cedar Rapids, Ia.—Bids were opened, April 24, for constructing concrete arch bridge across Cedar River at 16th avenue W. and the contract has been awarded to the Union Eng. & Contr. Co., of Chicago, Ill., at the lump sum bid of $69,460; it bid for concrete in piers and abutments below springing line of arches $7.10 per cubic yard; all concrete above springing arches except hand rails and lamp posts, $9.85 per cubic yard; reinforcement and other metal in structure in place, $3.75; filling between spandrel walls, 31 cents per cubic yard; hand-rails or parapet walls complete, $1.35 per linear foot; lamp posts, each $16.50; piling in place below concrete base, 32 cents per linear foot; lighting system complete, $650; fill both approaches ready for paving and sidewalk, 31 cents per cubic yard; maintaining old bridge and moving same, $3,200. Plain bar reinforcement to be used.

Other lump sum bids received were as follows: Bartlett & Kling, Cedar Rapids, Ia., $77,500; John B. Turner, Cedar Rapids, Ia., $87,170; Central States Bridge Co., Indianapolis, Ind., $88,000; Cedar Rapids Construction Co., Cedar Rapids, $74,999; Dearborn & Jackson, Cedar Rapids, $85,427, and A. Blodgett Construction Co., Kansas City, Mo., $80,814. Engineer, P. P. Smith, of Cedar Rapids.

Greenville, Miss.—Joliet Iron and Bridge Co., Joliet, Ill., has contract at $1,685, for 226-foot steel bridge over Jackson Bayou at Isola, for county.

Unionville, Mo.—Illinois Steel Bridge Co. has contract at $4,675 for erecting seven steel bridges for Putnam County.

Paterson, N. J.—The contract for a culvert on Montclair Avenue, Little Falls, has been awarded to the lowest bidder, Daniels & Cook, their figure being $44.50.

Carlsbad, N. M.—The Commissioners of Eddy County have awarded contracts for constructing steel bridges over Pecos River at Artesia and Carlsbad to the Midland Bridge Co., of Kansas City, Mo., for $12,000 and $10,000, respectively.

Mattituck, L. I.—The town officials have given out the contract for the new bridge at the Old Mill to the Canton Bridge Co. of Canton, O. The iron work will be 60 feet long, with a span of 50 feet, 18 feet wide and about 4½ feet from high water. The contract price is $10,950. Work is to be commenced as soon as the permission of the War Department is obtained, and the bridge must be completed by September 1. It will be a draw bridge, handsome in design and solid and durable as to construction.

Logan, O.—The contract for constructing a bridge on Logan Enterprise road, Falls Township, has been awarded to J. C. Enboten, of Logan, for $9,065.—Wilbur J. Watson, Consulting Engineer, Cleveland.

McAlester, Okla.—The Pittsburg County Commissioners have awarded contract to the Kansas City Bridge Co., Kansas City, Mo., at $10,719, for construction of six steel bridges, and to John T. Grigsby, Paris, Mo., at $8,883, for construction of seven steel bridges.

Hokendauqua, Pa.—The County Commissioners, April 20, opened bids for repairing the bridges at Hokendauqua and Lower Catasauqua. For the latter repairs, consisting of new steel beams and double wooden floor, G. H. Hardner was the lowest bidder at $6,775. The other bidders were: G. H. Clader, $7,475; Guerber Engineering Co., $7,370; Owego Bridge Co., $7,200; James K. Smith, $6,862.

Contract for laying a new wooden floor and relaying the old floor on the Hokendauqua bridge was awarded to George H. Clader at $47 per thousand feet for furnishing and laying new lumber and $10 for old. J. M. Smith bid $50.20 for new and $16 for old, and G. H. Hardner bid $47.50 for new and $15 for old.

Norfolk, Va.—The Board of Control has awarded contract at $9,160 to J. W. Davis, Newport News, for construction of reinforced concrete bridge at Lake Avenue.

Malden, Wash.—County Commissioners have let the contract for the steel bridge over Pine Creek at the west end of town to Archer & Co., Spokane, for $3,397.

Winnipeg, Man., Can.—Haney, Quinland & Robertson, Toronto, Ont., have been awarded contract for the steel railroad and traffic bridge across the Red River here for the National Transcontinental Railroad Commission; price, $495,000.

Port Arthur, Ont., Can.—Stewart & Hewitson, city, have received the contract from the Canadian Pacific Railway Co. for the construction of all concrete culverts and bridges to be built by the company between Port Arthur and White River during the next five years.

STREET CLEANING AND REFUSE DISPOSAL

Loomis, Cal.—The Chamber of Commerce has raised $1,000 for street and road sprinkling purposes; bids have been advertised; tanks will be erected along the line of the Loomis & Horseshoe Bar road.

Placerville, Cal.—Council has ordered the purchase of a sprinkling cart.

Perth Amboy, N. J.—The Mayor has approved motion to buy two street sprinklers.

Batavia, N. Y.—Dr. G. W. Collis, representing a Committee of the Civic Improvement League, has asked Board of Aldermen in behalf of that organization that the village authorities take steps to establish a municipal system of garbage collection and disposal.

Scranton, Pa.—The Joint Appropriations Committee has granted $10,000 for garbage system.

Victoria, B. C., Can.—The Street Committee has recommended that the City Engineer be authorized to obtain the necessary equipment for the rock crusher, and that the purchasing agent be authorized to purchase two new, double team water sprinklers.

BIDS RECEIVED AND CONTRACTS AWARDED

West Springfield, Conn.—The Board of Health has let contract for collecting garbage in town to Alexander Lemay; there were only two bids, those of Lemay and Benjamin Schladenhauffen, who had the contract last year.

Terre Haute, Ind.—The Board of Public Works is about to close contracts for building the $25,000 garbage crematory plant with the engineering firm of Lewis & Kitchen, of Chicago; a few items will be embraced in the revised plans and specifications of the Chicago firm and they will be awarded the contract. A member of the firm is expected here in a few days and all that remains is the signing of the papers and then work will be immediately started on the plant.

Red Bank, N. J.—Former Health Inspector James Millmore, of Long Branch, representing the Sea Board Utilization Company, of that city, was among the bidders to care for Red Bank's garbage; the Long Branch company's bid was $4,750 per year. The company guaranteed to burn all garbage and refuse at its Long Branch plant. There were several other bidders, one of the Roberts Safety Water Tube Boiler Company, for $3,000, another of U. S. Allen, of Fair Haven, whose bid was $1,950, and Clarence Gray, of Red Bank, for $1,800. All the bids were laid over.

Rochester, N. Y.—George Bantel's Sons were awarded the contract for sprinkling West Maple stret at $1.45 a week, and Charles W. Hartung, for Carter street, at $6 a week.

Rochester, N. Y.—For the washing machine wanted for the Municipal Hospital, the American Laundry Machine Company was the only bidder, for $487.67.

Syracuse, N. Y.—The C. A. Amos Coal Co. was successful in retaining the contract for the flushing of the asphalt pavements upon its low bid of $6.08 per team, submitted April 26; the city is to operate six flushing machines in two shifts of eight hours each and under this bid the total per diem cost will be $72.96. The contractors are required to furnish two men with each team and to pay the city $100 a season for each machine operated.

Dayton, O.—Out of the seventy-eight

streets on which the sprinkling contracts were let by the Service Board, William Turner received 74, A. F. Smart 1, and F. W. Kramer 3. The prices this year average lower on the thoroughfares than they did last year. As a noticeable reduction, Oxford Avenue is cited. The residents thought it was low last season when the price was $25, but this year it is but $14.

Beaver Falls, Pa.—Two bids for the erection of the approach to the crematory were received, that of George McFall for $1,175, and the Lewis & Kitchen Co. for $1,250; contract was awarded to McFall the lowest bidder.

South Bethlehem, Pa.—Chairman Groman of the Police Committee submitted these bids for the collection of garbage and ashes: A. Bauman & Co., $12,797; C. R. Wilde, $11,800; John J. Strausberger, $10,036.50; W. H. Repscher, $10,769; the bids are for a term of two years.

Woonsocket, R. I.—The City Council Committee on Streets and Bridges has awarded various contracts. The street watering will be done by Frank E. Arnold, the lowest bidder, his bid being $4.43 a day. George Wright of this city has been awarded the street sweeping for a substantial bid and the manure at the street barn for the year will be sold to Hachadoor Bogian.

Beloit, Wis.—The Board of Public Works, April 26, opened bids for sprinkling the streets for the coming year and the contract was awarded to Floyd Carter; the following bids were received: George Donner, $64 per week; I. G. Gharrity, $65 per week; D. F. Bassett, $75 per week; F. H. Carter, $58 per week; E. J. Atkinson, $69.50 per week.

MISCELLANEOUS

Little Rock, Ark.—House has passed bill providing for a topographical survey of and authorizing the drainage of the western district of Clay County.

Oakland, Cal.—Council has instructed the City Engineer to purchase an adding machine.

Redlands, Cal.—City Trustees are considering erection of a City Hall in order that the valuable city records may have better protection.

Sacramento, Cal.—State Engineer Ellery has invited bids for what will be known as the Feather River cut-off at Marysville; this is a project that is of paramount importance because it will reduce the danger from floods about Marysville; work will begin at Marysville and continue until a connection is made with the Yuba cut-off, which is already built; it will consist of a cut one mile long and 300 feet wide; cost has been estimated at $35,000; it will be done by dredger.

Waterbury, Conn.—The Board of Public Works will purchase a spraying machine to fight the elm tree beetle; machine will carry a 1½-hp. marine engine and 16 nozzles can be used from it at once; cost, $425.

St. Augustine, Fla.—Mayor Masters has recommended the purchase by the State of a strip of land adjoining the site of the new Deaf and Blind Asylum as a park to be used jointly by citizens and pupils of the institution.

Atlanta, Ga.—F. L. Olmsted, Brookline, Mass., has been selected to prepare plans for the permanent improvement of Piedmont Park and for the further improvement of Grant, Mims and Springvale Parks.

Fort Wayne, Ind.—The Wabash and the Pennsylvania engineers have submitted to the city administration plans for track elevation at Calhoun street which provide for a sixty-six-foot subway, divided into a twenty-three-foot space fifteen and one-half feet from surface to ceiling, for street car rails and for a roadway on each side, with still a six-foot sidewalk on either side.

Garner, Ia.—County Board has selected a site for the erection of a jail.

West Burlington, Ia.—Citizens have voted $52,000 bonds for a new Town Hall.

Salina, Kan.—Mayor C. B. Kirtland has recommended that a Committee on Parks and Parking be organized to lay out a complete park system.

Louisville, Ky.—Improvements are to be made to the First, Fifth and Sixth District police stations.

New Orleans, La.—Bids will be received May 21, noon, for $2,000,000 public improvement bonds.—T. Wolfe, Jr., Secretary Board of Legislation.

Boston, Mass.—Aldermen have passed bill providing for a $115,000 loan for the Bath Department, $125,000 for the Consumptives' Hospital Department, $99,500 for the Park Department and $245,000 for the Public Buildings Department.

Springfield, Mass.—The Board of Aldermen has passed the order providing for the erection of a municipal group of buildings at Court and Pynchon streets.

Bay City, Mich.—The Park Commission has set aside Washington Park as a playground for children.

St. Paul, Minn.—To Cass Gilbert, architect of the new $5,000,000 State Capitol Bldg., has been intrusted the task of creating a "city beautiful" to surround the splendid building and by July 1 his report will be forwarded to Council; on this basis, the city will begin the work of constructing suitable approaches to the building, several of which will totally reconstruct the street arrangement of important districts; work will cost $2,000,000.

Virginia, Minn.—Plans have been prepared by Architect Radcliffe, Duluth, for remodeling the City Hall.

Clarksdale, Miss.—The Yazoo-Mississippi Delta Board of Levee Commissioners has instructed Chief Engineer T. G. Dabney to contract for the building of three miles of levee at Star Landing, in DeSoto County, which work will be undertaken as soon as necessary arrangements can be made.

West Point, Miss.—Burt Stuart, Rosenbaum Bldg., Meridian, is preparing plans and will soon let contract for proposed City Hall building.

Hannibal, Mo.—Barnett, Haynes & Barnett, Century Bldg., St. Louis, will finish plans about May 15 for the proposed City Hall.—John J. Cruikshank, Chairman Building Committee.

St. Joseph, Mo.—City has sold $100,000 county jail building bonds.

Camden, N. J.—Council has adopted a resolution authorizing a $30,000 bond issue to complete police and fire alarm system in the city.

Camden, N. J.—Councils considering installation of a municipal ice plant. Councilman Browne has offered resolution that Chief Engineer of the Water Department be instructed to secure estimates on cost of installing in plant at Morris station.

New Brunswick, N. J.—City is considering the acquirement of a plot owned by Freeman Woodbridge as a site for a park; triangular plots are also to be laid out in various parts of the city.—Chas. Deshler, Chairman Park Commission.

Trenton, N. J.—Governor Fort has signed the bill authorizing the city to construct a tunnel under the Delaware and Raritan Canal and the Pennsylvania Railroad at the entrance to Cadwalader Park.

Buffalo, N. Y.—Acting Health Commissioner Fronezak has estimated that about $35,000 is needed to fight scarlet fever; about $17,000 of this is for equipping and maintaining the temporary hospital for scarlet fever; the Aesculapian Association has asked that a temporary hospital for the treatment of diphtheria be established similar to the scarlet fever hospital.

Fulton, N. Y.—On account of the strenuous objection of the neighbors in the vicinity of the property of Lawrence Van Buren, which was made the public dump, held some time ago, the Board of Public Works has rescinded its motion, and negotiations are being carried on to secure the old dumping ground.

Kenmore, N. Y.—Citizens are considering the acquirement of a triangle of land between Delaware avenue, Old Delaware road and Allegheny avenue for a public park.

New York, N. Y.—Legislature has passed bills admitting private capital to subway competition, and the Public Service Commission will take immediate action on two and perhaps three new subways; bids will be asked on the Broadway-Lexington Avenue route before the end of May.—Chairman Willcox is interested.

New York, N. Y.—Architects Hunt & Hunt have prepared plans for a four-story police station.—Theo. A. Bingham, Commissioner.

Niagara Falls, N. Y.—Harry A. Allison, of Buffalo, has conferred with the members of the Park Commission, Chairman Carl E. Tucker, as to the cost and manner of equipping two playgrounds for the children for use this summer.

Ovid, N. Y.—Citizens are considering the erection of a Town Hall.

Schenectady, N. Y.—City will purchase ground adjoining the new South Center street school for park purposes.

Syracuse, N. Y.—City will provide citizens with a variety of baths, free of charge; the Syracuse municipal bath house will be remodeled and improved; plans provide for the erection of a 12-foot concrete platform along both sides and at end of swimming pool; dressing rooms will also be provided; $4,000 is available.—F. M. Westcott, Commissioner of Public Works.

Troy, N. Y.—Authority has been granted City Engineer to employ an architect to prepare plans for the remodeling of the North End pumping station into a public bath house.

Raleigh, N. C.—The Legislature has authorized city to issue $120,000 bonds for a municipal building and auditorium.

Grand Forks, N. D.—Mayor J. D. Taylor has recommended the erection of a City Hall.

Cincinnati, O.—John E. Bleekman, New York, President of the Southwestern Ohio Traction Company, recently incorporated, has asked the Council for a franchise for an underground and elevated railroad system extending from the heart of the city to Norwood, a suburb; more than $5,000,000 will be expended if the franchise is granted.

Columbus, O.—The Board of Service will be asked to provide more seats in the public parks.

East Liverpool, O.—A resolution asking Council to issue bonds in the sum of $24,000 for the purpose of a site and the subsequent erection of a new garbage reduction plant has been passed by the Health Board.

Piqua, O.—City is considering the construction of a tool house; total cost, $731.

Ambridge, Pa.—Architect James T. Steen is preparing plans for the erection of a three-story brick and stone Town Hall; cost, $25,000.

Connellsville, Pa.—Council is considering the numbering of houses on the West Side and the placing of street signs.

Franklin, Pa.—The City Engineer will prepare plans for the rebuilding of about 100 feet of the stone retaining wall on Petroleum Street.

Harrisburg, Pa.—Council is considering an ordinance which provides for a park in South Harrisburg.

Johnstown, Pa.—Mayor Wilson has recommended a $3,000 appropriation for a modern automobile patrol.

Philadelphia, Pa.—Council has passed an ordinance to purchase the property bounded by Thirty-second, Thirty-third, Reed and Dickinson streets for park purposes.

Philadelphia, Pa.—Architect W. Bleddyn Powell is preparing plans for three police stations, patrol garage and a fire station.—Henry Clay, Director Department of Public Safety.

Philadelphia, Pa.—Director Chase is urging the substitution of a modern automobile police patrol system for the present horse patrol service.

Pittsburg, Pa.—Council has passed ordinance authorizing a $1,370,500 bond issue; bonds will provide for extension of sewer system in East End; construction of bridges and installation of machinery at pumping plant.

Pittsburg, Pa.—Council has passed ordinance authorizing the purchase of a $4,500 automobile for the Public Works Department.

Pittsburg, Pa.—Plans are well under way for the construction of the incinerating plants by the city to dispose of ashes and rubbish; no definite selection of sites has been made; a bond issue of $185,000 was authorized at the last November election to build incinerating plants, but it is now believed the cost may exceed that amount; bonds have not been sold.

Rochester, Pa.—Borough Council will consider a $100,000 bond issue for the erection of a city building and for paving various streets.

Scranton, Pa.—The Joint Appropriations Committee has granted an extra $500 for new watering troughs.

Newport, R. I.—Commander Fullam of the Naval Training Station has asked the Navy Department for $30,000 for the construction of new sea walls.

Fayetteville, Tenn.—House has passed bill authorizing city to issue improvement bonds.

Jackson, Tenn.—The Senate has passed third reading bill authorizing city to issue $25,000 bonds for erection of City Hall and other improvements.

Knoxville, Tenn.—The Knoxville Railway and Light Committee will spend several thousand dollars in improving Chelhowel Park this spring.

Memphis, Tenn.—Senate has passed bill allowing city to issue $260,000 bonds to build a police station and engine house.

Memphis, Tenn.—Bids will be received by the Park Commission May 22, 1:30 p. m., for $1,000,000 park and parkway bonds.

Norfolk, Va.—The Finance Committee has recommended a $1,000 appropriation for the purchase of street signs to be erected at the intersection of streets.

Richmond, Va.—The Finance Committee has appropriated $25,000 in annual budget for 1910 for purchase of site for Confederate Memorial Building; plans to be secured at once; cost, about $150,000.—George L. Christian, Treasurer Confederate Memorial Association.

Pasco, Wash.—Council will soon consider plans for the erection of a City Hall; cost, $10,000.

Puyallup, Wash.—Citizens will vote May 25 on $10,000 river improvement bonds.

Seattle, Wash.—Council has passed bill authorizing Park Board to expend $30,000 on the purchase of a playground at Ballard.

Seattle, Wash.—Council is considering a bill appropriating $25,000 for a contour map